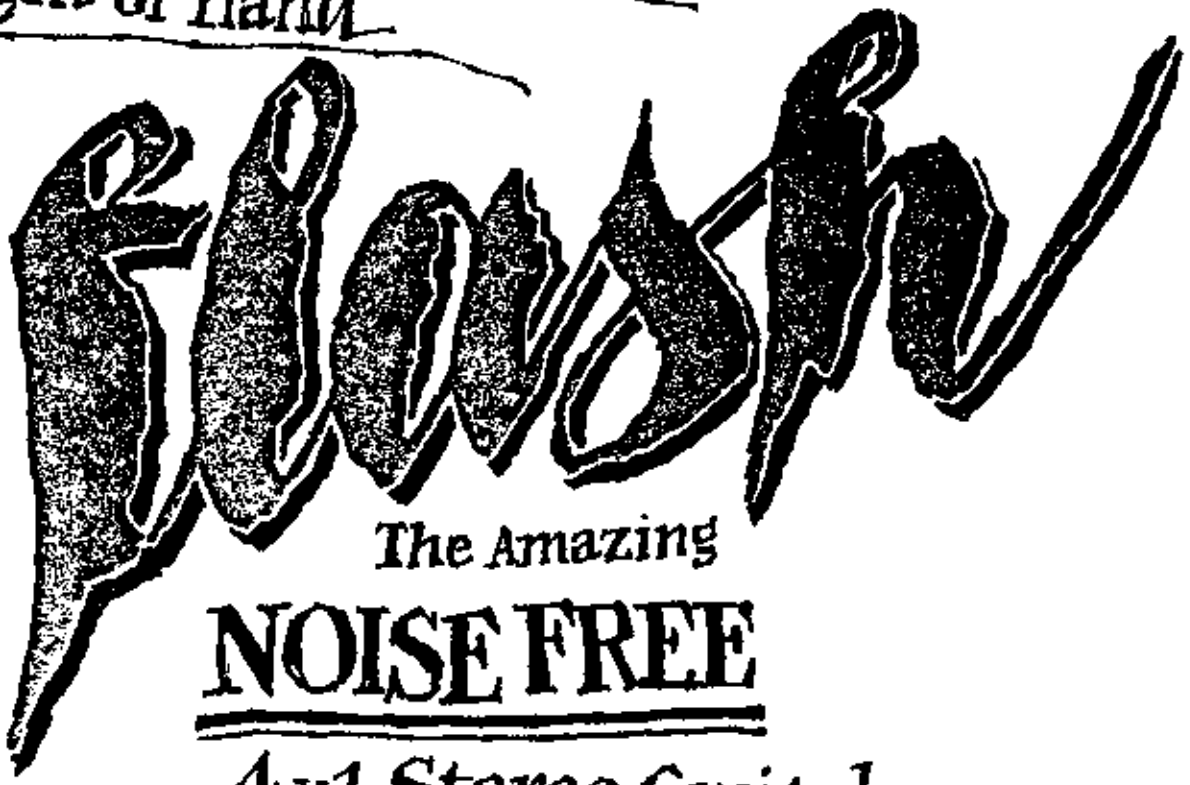
SECRETS OF SIGNAL SWITCHING REVEALED

Amaze your friends
and amuse your neighbors
with signal processing
sleight of hand



The Amazing

NOISE FREE

4x1 Stereo Switcher
with Passive Mixing and MIDI

UPTOWN

Flash

The Amazing

NOISE FREE

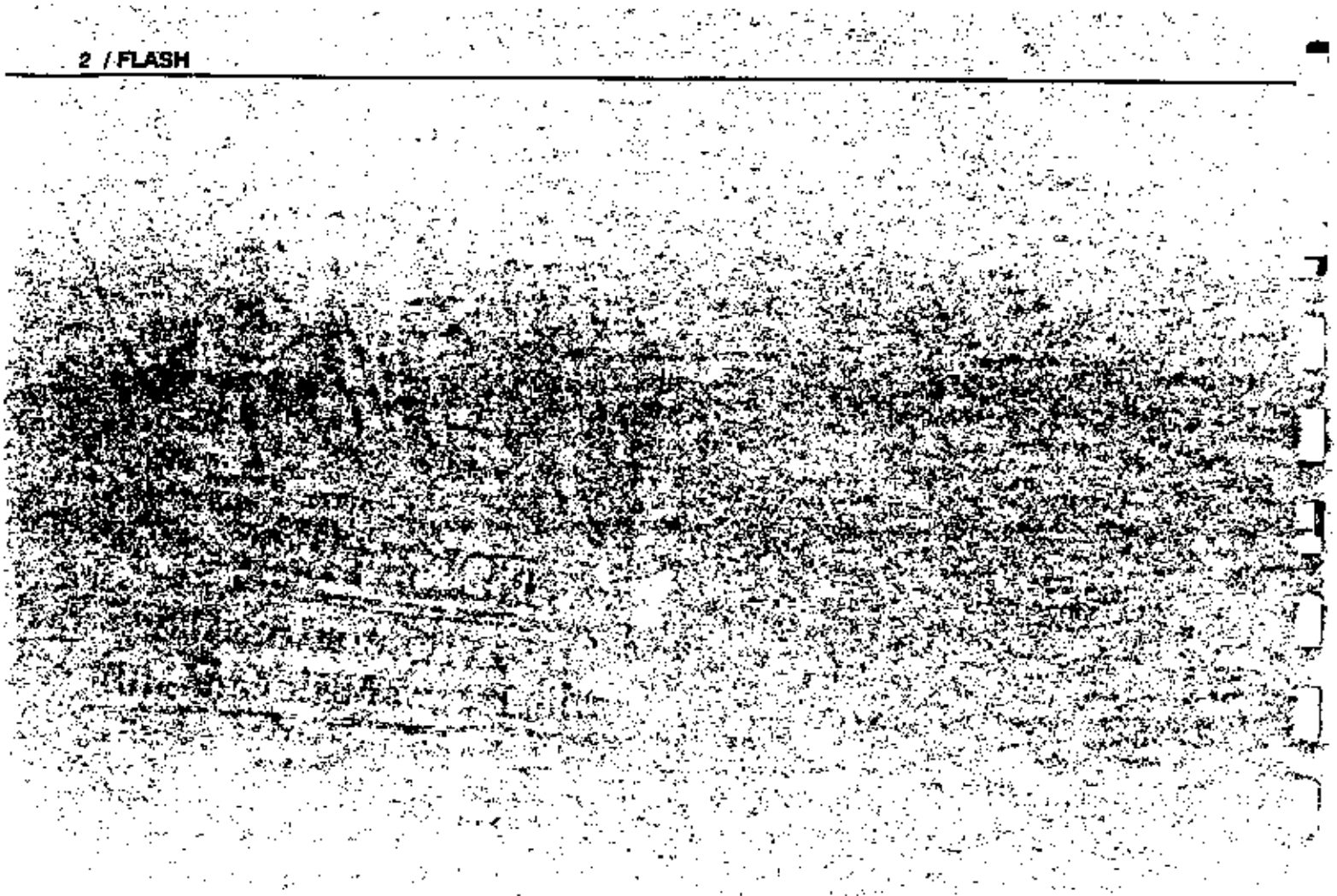
4x1 Stereo Switcher with Passive Mixing and MIDI

☐ OPERATION & APPLICATIONS

Text by Freff • Cover & headings by Noel Spangler • Diagrams by Dennis Adams • Schematics & plots courtesy Jon Blick, Al Jewer, and the Uptowners at the Lab

Uptown Technologies, Inc.
303 W. Main Street
Whitewater, WI 53190
414-473-1088
fax: 414-473-8809

FLASH applications line: 414-563-9932
(9-5 Central Time)



(Mostly) Standard Warnings

Your FLASH was made in America, using audiophile-quality electronic components. It comes to you in a durable steel and aluminum case with an unusual (and tough) custom-car finish. With proper care, respect, and rackmounting your FLASH will silently switch and mute signals for years to come.

That said, there are still some no-nos.

THE BIGGIE

DO NOT run amplifier outputs through your FLASH. Any signal up to 50 volts and 1/10th of a watt is just fine (this includes all standard microphone, line, preamp, video, timecode, digital bitstream, and control voltage outputs). But go past those levels and you could fry components on your FLASH's circuitboard.

COMMON-SENSE STUFF

DO NOT keep your FLASH in direct sunlight for long periods of time.

DO NOT expose your FLASH to excessive heat or humidity (like spilled Pepsi, beer, or worse).

DO NOT expose your FLASH to dust or sand.

DO NOT check your FLASH as airplane luggage unless it is inside a good flight case.

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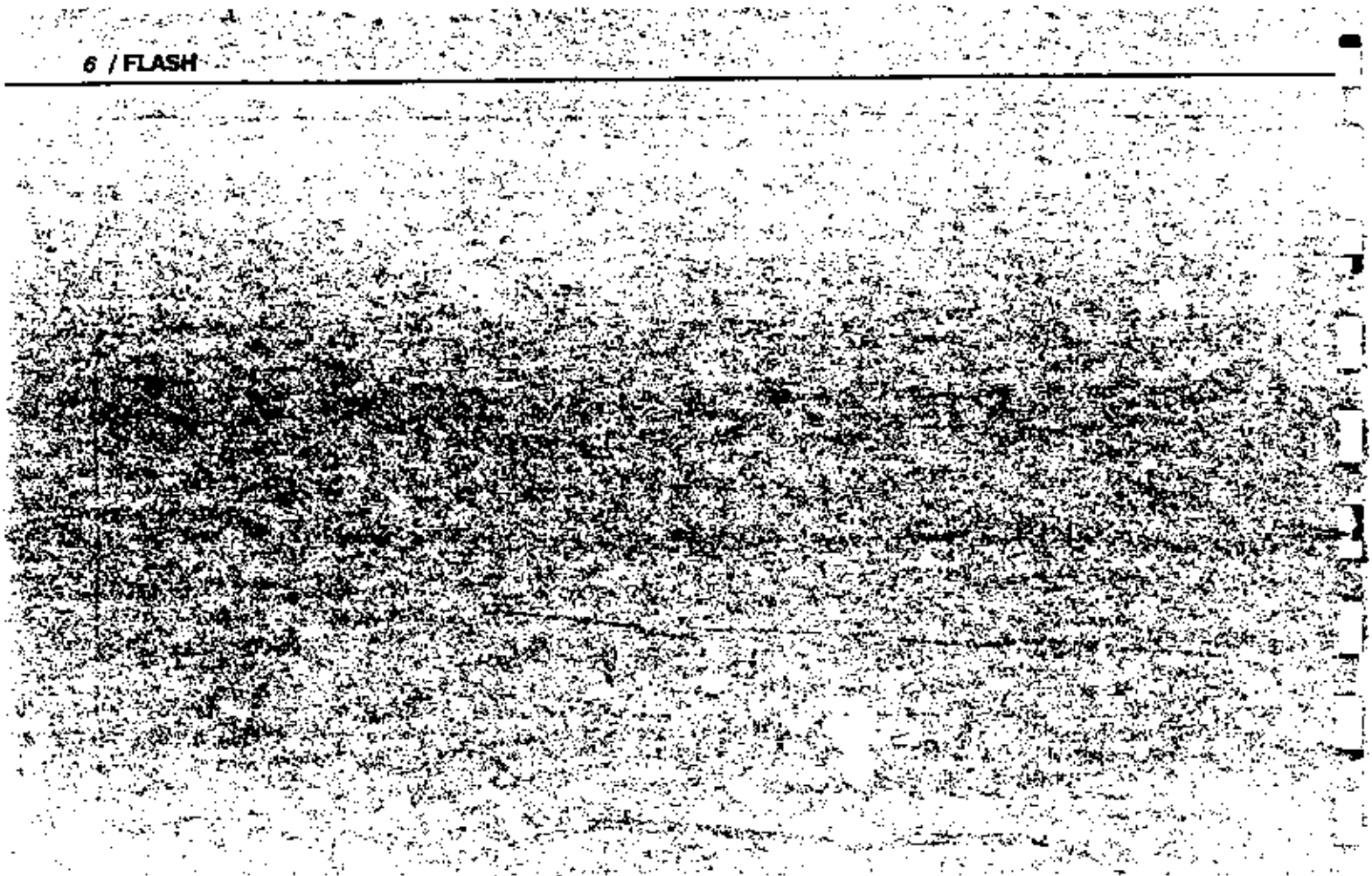
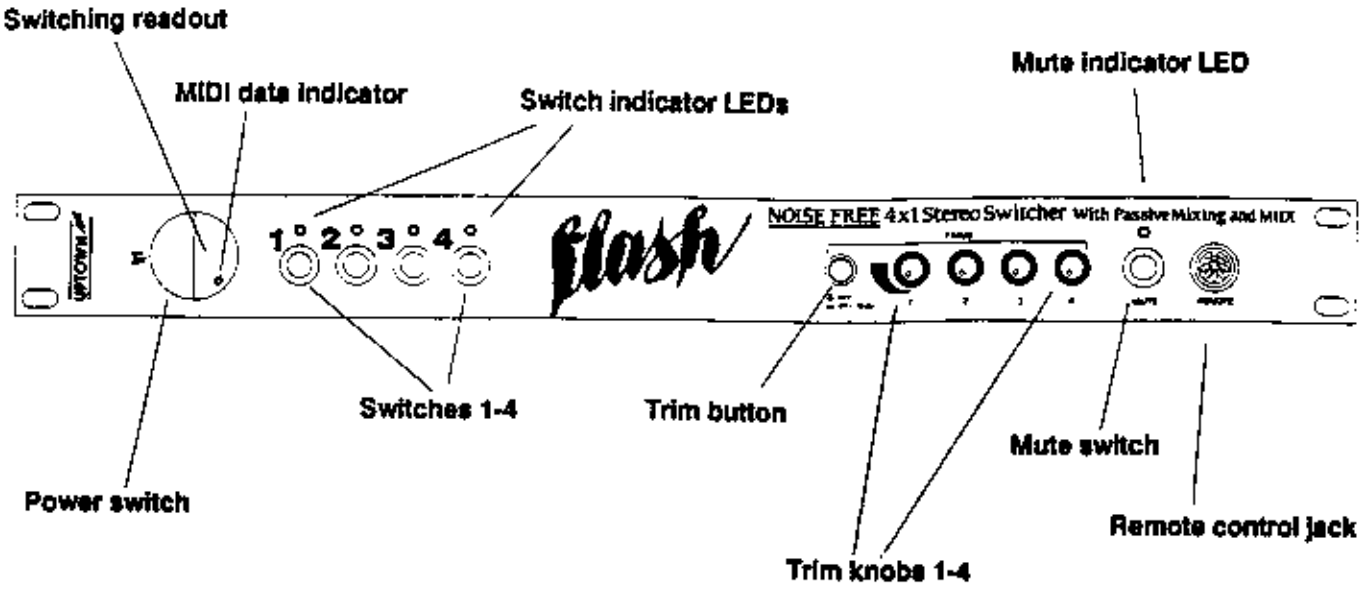
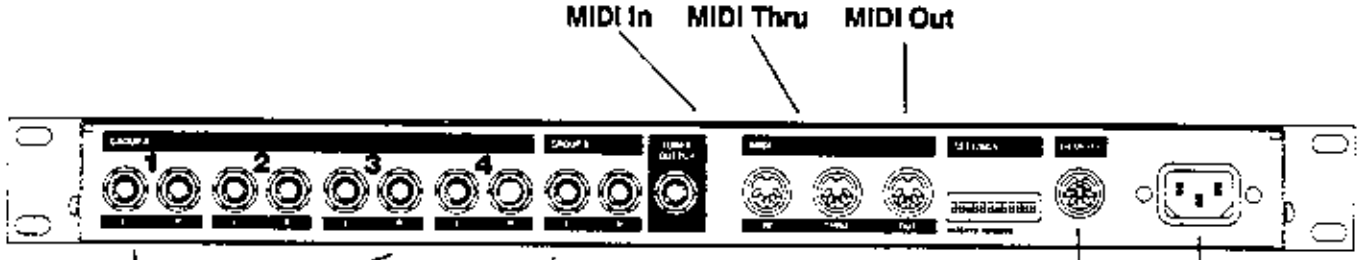
DIAGRAMS







Group A jacks
Either input or output, depending on application.

Group B jacks
Either input or output, depending on application.

Tuner output
Output only, containing the sum of all selected Group A left inputs. Mute does not affect this output.

Remote control jack

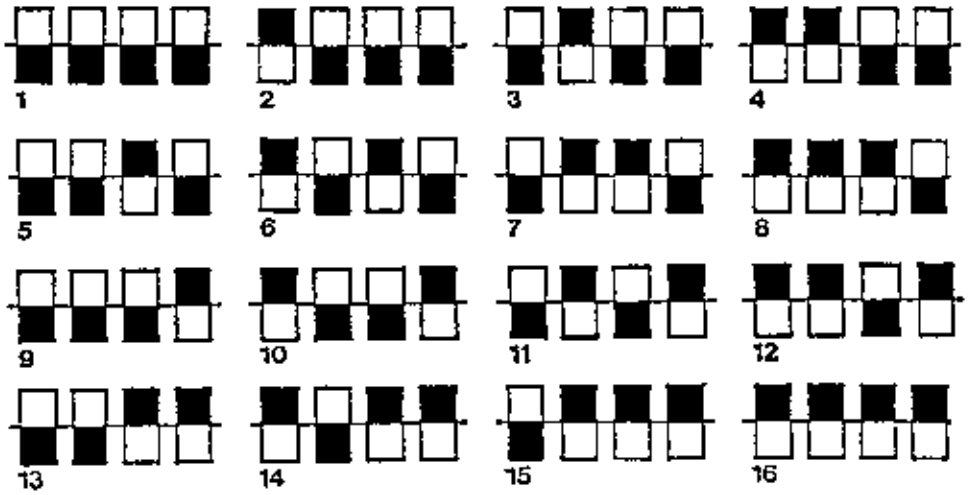
Settings
DIP switches used to select various choices concerning MIDI, switching, and defaults.

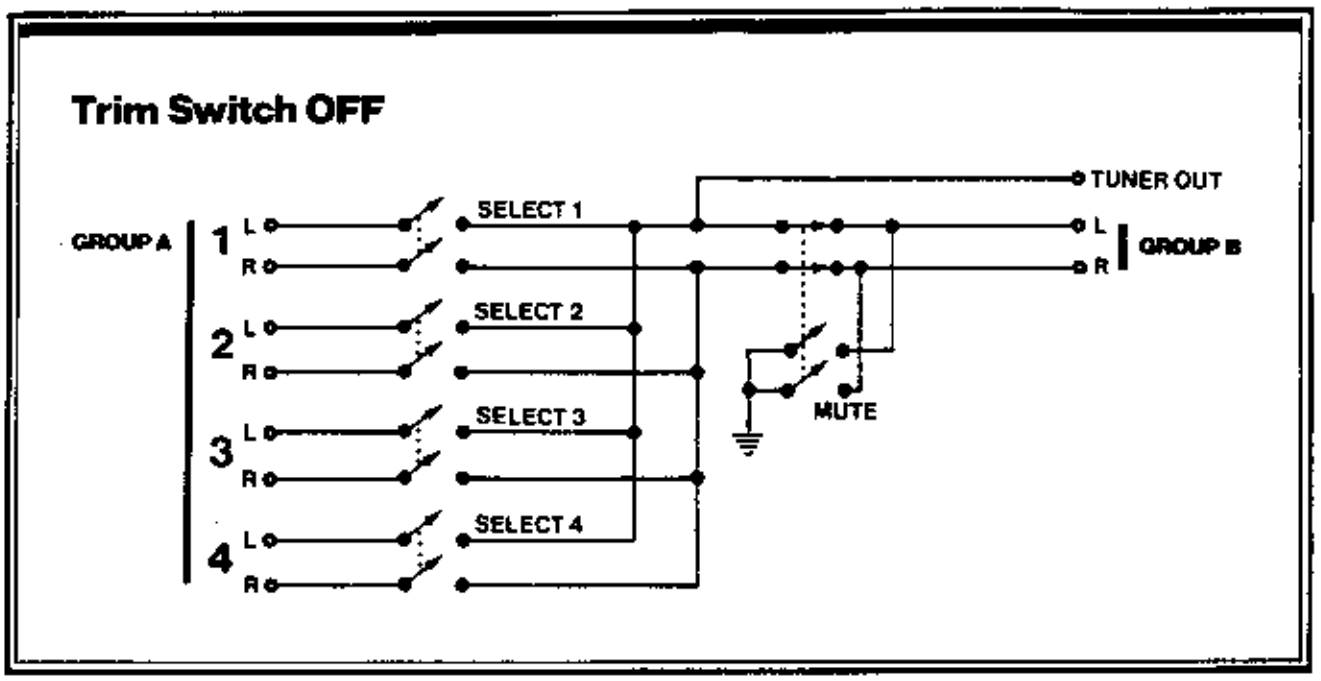
REAR PANEL DIP SWITCH SETTINGS

SWITCH	FUNCTION	FACTORY DEFAULT
#1-4	MIDI channel selection (1-16)	16
#5	MIDI Local Control (on/off)	on
#6	MIDI Merge (on/off)	off
#7	MIDI Response Range (low/high)	low
#8	Switching Mode Default (punch/latch)	punch
#9	Mute Mode (latch/momentary)	latch
#10	Mute Light (steady/blinking)	steady
#11	Mute Default on Power-Up (mute off/mute on)	on
#12	Ground Choice (ground lift/chassis ground)	lift

Factory Defaults

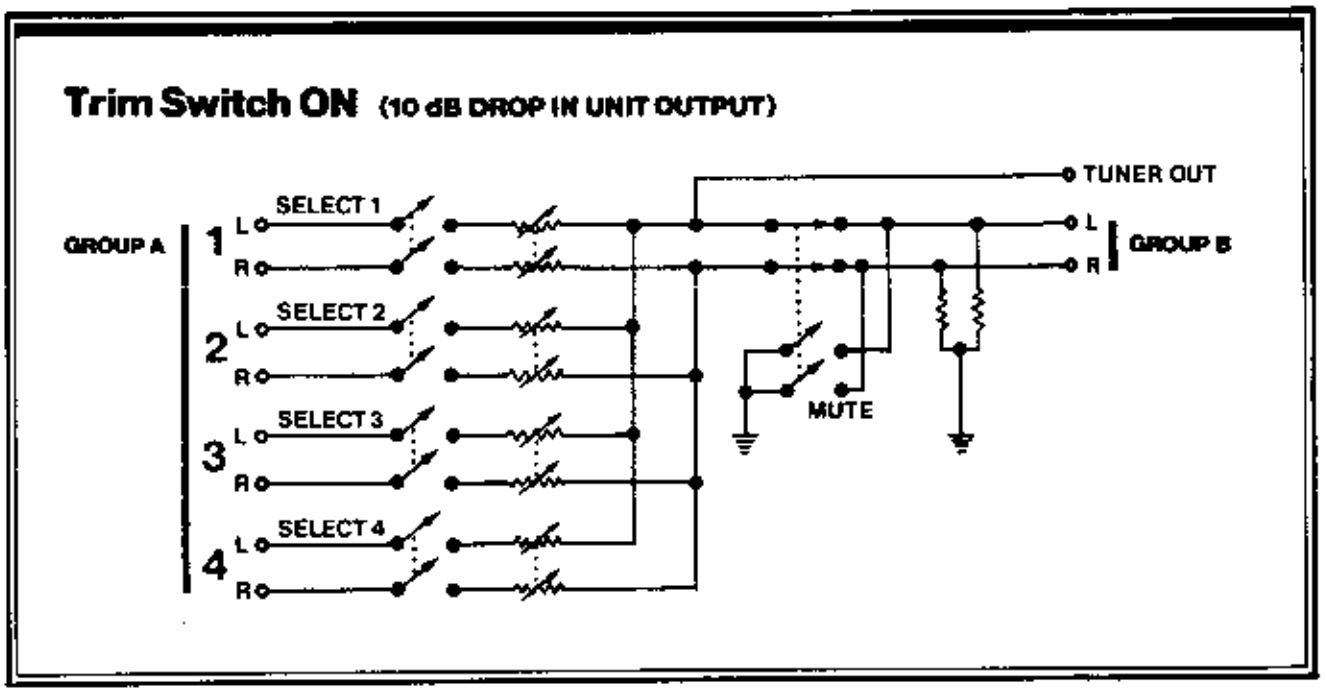
MIDI CHANNEL





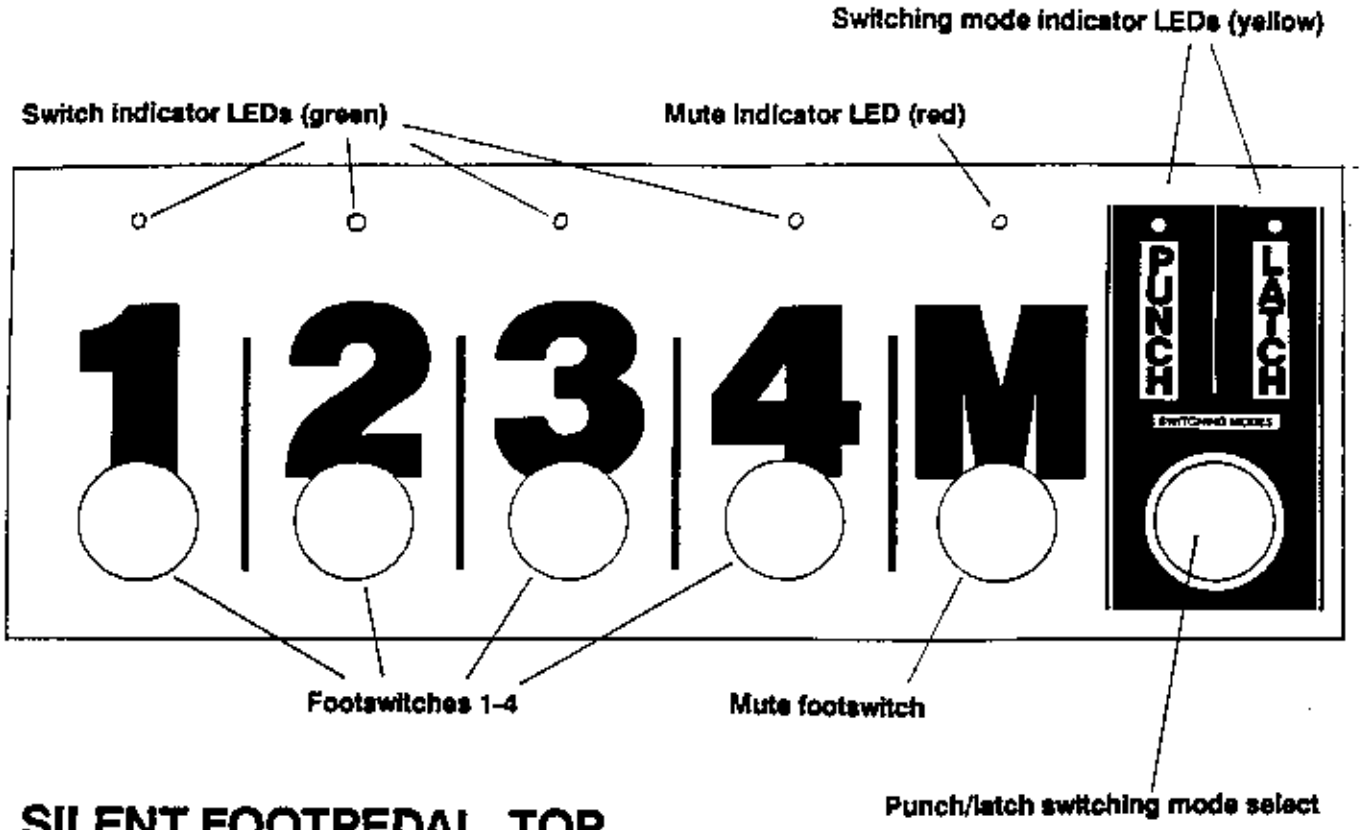
BASIC SCHEMATIC (TRIMS OFF)

When the front panel trim switch is out, the trims are off and signals can flow through FLASH in two directions: from Group A to Group B or vice-versa. The trims should be off for most *selecting*.

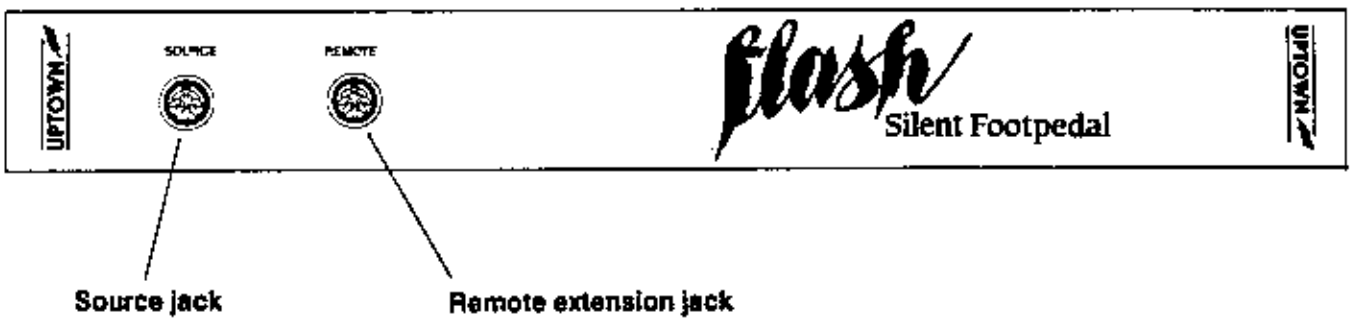


BASIC SCHEMATIC (TRIMS ON)

When the front panel trim switch is pushed in, the trims are on and signals flow through FLASH in only one direction: from Group A to Group B. The trims should be on for most *layering*.

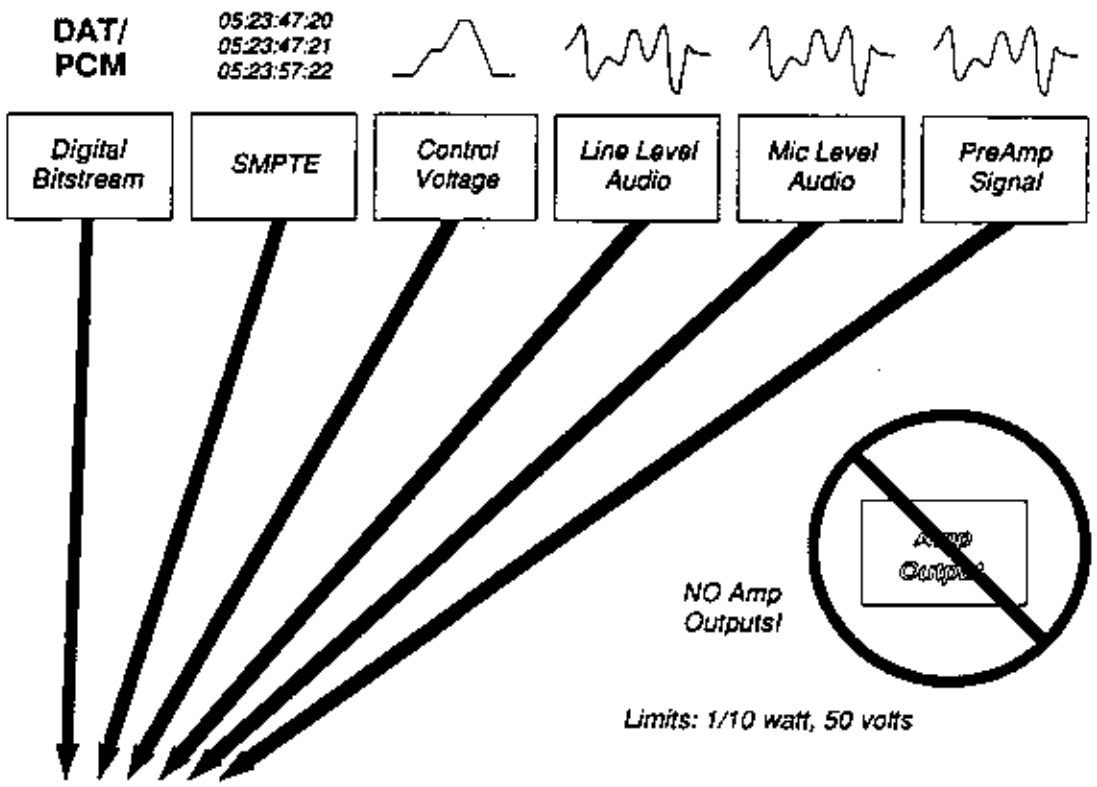


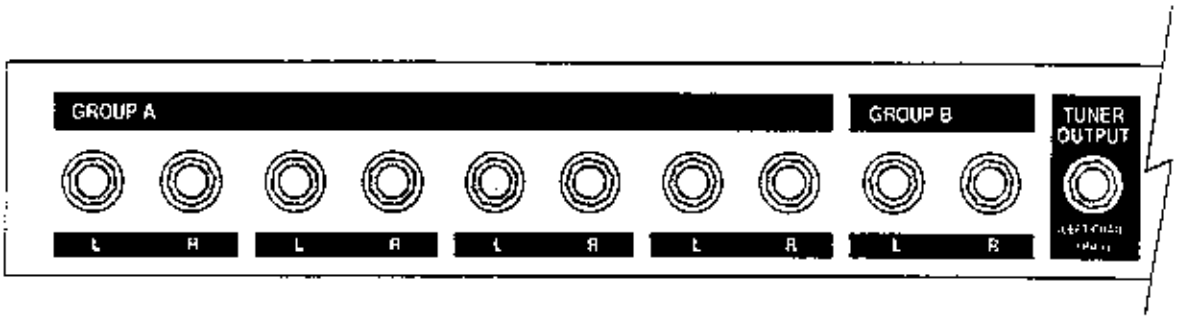
SILENT FOOTPEDAL, TOP



SILENT FOOTPEDAL, REAR

TYPES OF SIGNAL THAT FLASH CAN ROUTE AND SWITCH

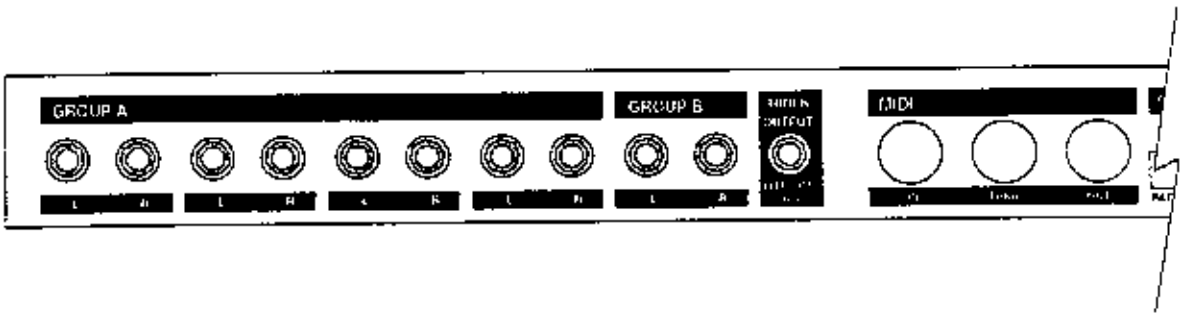




FLASH – BLANK CONNECTIONS SHEET (with MIDI)

Please make copies of this page to use in developing FLASH wiring schemes for your own applications.

Use:_____



1

The Intro... WHAT and WHY

"Silence isn't golden. It's purple"

The basic concept of FLASH is simple: noise-free switching, layering, and muting under both manual and MIDI control. As it turns out, however, the implications of this concept aren't simple at all. FLASH can do many more things than we ever imagined it might.

So what exactly is FLASH?

Well, it's a switcher. And a submixer. And a mute. And a mult. It is also a loop selector, a programmable autopanner, a DAT editor, a SMPTE router, an automated footswitch trigger, a mixboard expander, a feedback controller, an amp-sharing device, an audio keyer, a digital bitstream switcher, a submix bus mute automation system, an audio "razor blade," a limited video switcher, a noiseless master fader replacement, a resurrector of old effects, an electrical troubleshooting tool, a variable voltage gate, an on/off controller for anything that runs on AC power, and many other things. Heck, it even does windows (timing windows, that is). Based on our experience to date it looks like new FLASH applications are going to be popping up for years.

There are five key facts about FLASH that you should always keep in mind.

(1) **FLASH is unusually flexible.** In most gear, INs are INs and OUTs are OUTS, period. Not so in FLASH, where jacks can be either INs or OUTs depending on the application. The source of this flexibility is FLASH's combination of passive circuitry and a dual 1 x 4 signal bus.

(2) **FLASH can handle many different kinds of signals.** The passive circuitry and opto-isolated switching resistors will handle all mic, line, and preamp level analog audio signals; control voltages and straight power up to 50 volts and 1/10th of a watt; SMPTE; and even PCM audio, AES/EBU, and other digital bitstreams. *WARNING – What FLASH definitely cannot handle is amplifier outputs. Any signal over 50 volts or .1 watt (100 milliwatts) will damage your FLASH's circuitboard.*

(3) **FLASH is absolutely quiet.** FLASH's noise floor is -108dB (-112dB with the mute engaged), its total harmonic distortion is too low to be measured, and it has absolutely no switching noise. Even the optional remote footpedal is mechanically silent, for optimum use in a live-miked digital recording environment.

(4) **FLASH is completely MIDI-controllable.** Want to switch between 256 possible audio combinations? Want to mute a signal up to 100 times a second? FLASH will do both of these over MIDI. In addition, thanks to a nifty trick that will be described later, two FLASHs can be independently controlled over a single MIDI channel.

(5) **FLASH is so good it can make other gear look bad.** Example #1: FLASH can respond to MIDI commands faster than most sequencers can send them. So if FLASH switches irregularly in response to a particularly intense sequence, odds are that the sequencer in question is screwing up, not FLASH. Example #2: If you switch between three super-clean audio sources and one that is a little dirty, the one that is dirty is going to sound noticeably worse than it would on its own, with nothing to directly compare it to. The noise you hear whenever you switch to it will be that unit's residual noise, and no fault of FLASH's.

RECIPE FOR A QUICK FLASH DEMO: SWITCHING

(1) Set up FLASH as per the instructions in section 3 of this manual, **Basics**.

(2) Connect a couple of stereo signal sources to the pairs of jacks marked 1 and 2 on the back of FLASH. These sources can be anything—two synths that are MIDIed together, a couple of CD players, a CD player and a tapedeck, two signal processors, anything.

(3) Plug the two GROUP B jacks into your mixer or amplifier.

(4) Turn FLASH on.

(5) Make sure that the TRIM button is out and MUTE is off.

(6) Start your sources making sound.

(7) SWITCHING: Press the buttons marked 1 and 2 on the front of FLASH in order to repeatedly switch between your signal sources.

RECIPE FOR A QUICK FLASH DEMO: LAYERING

Repeat instructions 1-4 in the box above. Then:

(1) Make sure that MUTE is off, the TRIM knobs are turned fully clockwise, and the TRIM button is pushed in.

(2) When the TRIM button is in, FLASH's output goes down by 10dB. Compensate for this drop by increasing the input gain on whatever piece of gear the GROUP B jacks are connected to.

(3) Start your sources making sound.

(4) LAYERING: Press switching buttons 1 and 2 *together* in order to hear both sources at the same time. Use TRIM knobs 1 and 2 to adjust their relative volume.

FUN VARIATIONS ON A DEMO THEME

Don't stop at just two sources. Plug in three sources, or four, and go crazy switching and layering. Move on only when you feel like it.

AMAZE YOURSELF! AMAZE YOUR FRIENDS!

One of FLASH's big selling points is the fact that it is noise-free. Musicians and engineers being the I'll-believe-it-when-I-hear-it-for-myself types that they are, we decided to design some simple but effective little proofs. What's important in these demonstrations is not necessarily what you hear, but what you DON'T hear: i.e., switching noise, pops, thumps, clicks, or glitches of any kind.

For some incredibly varied real-world uses of FLASH, see the massive APPLICATIONS section elsewhere in this manual. Meanwhile, next time you meet a person with a certified set of Golden Ears (or if you have a pair of your own) you might want to give these little tricks a whirl.

INSTANT LACK-OF-SWITCHING-NOISE DEMO

(1) Using two female-to-male RCA Y-jacks, split the output of a CD player so that you have two identical sets of L/R signals.

(2) Using 1/4" adapters, plug one of these output sets into the first pair of GROUP A jacks on FLASH. Make sure LEFT is plugged into LEFT and RIGHT into RIGHT. Plug the other set into the second pair of GROUP A jacks, likewise.

(3) Plug the two GROUP B jacks into your mixer or amplifier.

(4) Turn FLASH on.

(5) Make sure that the TRIM button is out and MUTE is off.

(6) Play a CD, preferably one with long, slow notes.

(7) Repeatedly switch between 1 and 2. You should hear no click or pop at the switch point. Indeed, you should hear absolutely *no* change in the music at all. Which is exactly the point of noise-free switching.

(Variation 1) MIDI GAMES

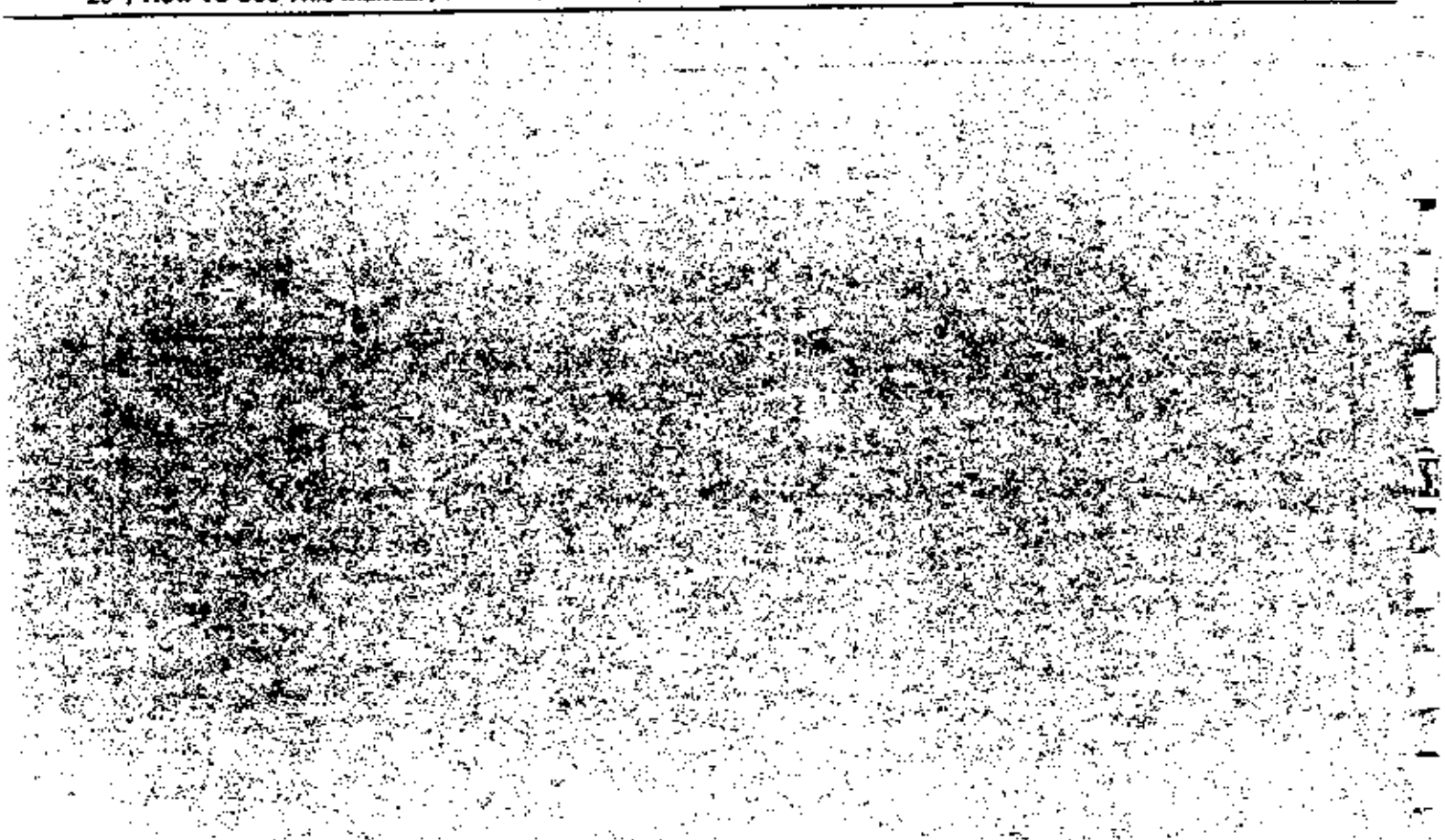
Plug your sequencer's MIDI Out into FLASH's MIDI In. Then send FLASH a stream of program changes, alternating between 1 and 2, on whatever MIDI channel it is currently set to receive (the factory default is 16). Start out slow and gradually work the tempo up. By the time you are sending a program change on every eighth note at a tempo of 180 BPM, then FLASH will be switching between the identical CD signals exactly six times a second and you still won't be able to hear any switching noise. Nifty as this is, however, it barely scratches the response speed of FLASH, which can shift as rapidly as 100 times a second.

(Variation 2) FLIPPING THE STEREO FIELD

First, find a CD with some program material that is panned hard to the left or right. Drumbeats tend to work well. Then flip the inputs that are plugged into FLASH's GROUP A jacks so that those in #2 are reversed (i.e., the LEFT output from the CD is plugged into the RIGHT jack and vice-versa). Now when you listen to the CD you can choose whether you want to select the stereo image as originally recorded (press #1), or flipped (press #2), or summed to mono (press #1 and #2 together). For a killer demonstration, play the selected passage straight and then play it again, using switches 1 and 2 to bounce what used to be a hard-panned sound back and forth between both speakers!

2

How to Use This Manual



A "How To Use This Manual" section is useful, obligatory, and typically ignored—sort of like airplane safety demonstrations—so we'll try to make this one quick and painless.

WHAT'S AHEAD

Here are the upcoming sections of this manual and what they cover:

- Section 3, **Basics**, lives up to its name. It provides plain explanations of what FLASH is, what it does, and what that can mean to your work.
- Section 4, **Operation by Hand or Foot**, tells you how to run FLASH from either its front panel or from one or more optional silent footpedals.
- Section 5, **Operation via MIDI**, tells you all about FLASH's simple (but powerful) MIDI implementation.
- Section 6, **Applications**, is for browsers. Consider it an idea cookbook full of recipes for neat things to do with FLASH. Some of these applications and techniques will be useful to you. Others will not. Taken all together, however, they demonstrate FLASH's extreme flexibility and should provide plenty of launching pads for your own brainstorming.
- Section 7, **When "Noise-Free" Isn't: Problems and Fixes**, is about dealing with FLASH in the less-than-ideal real world. We recommend that you look this part over carefully *before* you go FLASH-crazy, so you know how to cope with some of the modern-day equipment gremlins that FLASH has been known to reveal.
- Section 8, **The Outro (WHO and HOW)**, is our closing curtain, complete with bows and all due acknowledgements.
- Included as an encore are the **Technical Appendices**, several large chunks of heavy specsmanship, detailed reference, and schematics intended for the pleasure of any severe machineheads in the audience. (Hey, we can say it: we've got a full crew of cyberpunks here ourselves.)

HOW TO APPROACH THIS MANUAL

What you should do to get the most out of this manual depends on who you are.

If you are a *beginner*, take each section in order and try out as many things as you can.

If you are an *audio & MIDI expert* you will probably prefer to look over the **Diagrams**, skim the **Technical Appendices**, read **When "Noise-Free" Isn't**, and then bomb around at your own whim. Check the manual if you should hit some wall you can't figure out for yourself.

Those who feel they belong in the middle of these extremes (i.e., most of us) should read **Basics**, the two **Operation** sections, and **When "Noise-Free" Isn't**, then start exploring the **Applications** section for ideas.

3

Basics

On the front of FLASH is a single descriptive line which says *Noise-Free 1 x 4 Stereo Switcher with Passive Mixing and MIDI.* This is a reasonable shorthand description of FLASH, but it leaves out some necessary detail.

Like how to hook it up, for example.

INSTALLING FLASH

FLASH can be used either stand-alone or in any 19" rackmount. For stand-alone use we have included attachable rubber feet. For rackmount applications we have included black screws and black protective washers.

Supplying power to FLASH is easy. Just put the detachable power cable that came included with FLASH into the rear panel power jack and plug the other end of the cable into an outlet. (If you lose or misplace this cable, any IEC standard 3-prong power cable will do.)

CHOOSING YOUR SETTINGS

On the back of FLASH there are 12 DIP switches. These are used to set default choices for switching, muting, MIDI control, and choice of ground. You can leave these switches alone and rely on the factory defaults shown earlier, in the **Diagrams** section, or you can change their settings at any time (even while FLASH is on).

For your convenience and information before installation, a shorthand guide to the rear panel DIP switch settings is printed on top of FLASH.

- **Switches 1-4** select the MIDI CHANNEL that FLASH receives and sends on. The factory default is MIDI channel 16.
- **Switch 5** turns LOCAL CONTROL on and off. When local control is on, FLASH responds to its own front panel controls, any attached footpedals, and incoming MIDI. When local control is off, FLASH responds only to incoming MIDI. The front panel controls and any attached footpedals will still function to send MIDI data *out*, but are otherwise ignored. The factory default is ON.
- **Switch 6** turns MIDI MERGE on and off. When on, incoming MIDI data is merged with FLASH-generated MIDI data and both are sent over FLASH's MIDI Out. When off, incoming and outgoing MIDI data do not mix. The factory default is OFF.
- **Switch 7** selects between two MIDI RESPONSE RANGES: low and high. These will be discussed later in this section, and again in section 5, **Operation by MIDI**. For now all you need to know is that you can independently control two separate FLASHs on one MIDI channel by switching each FLASH to a separate range. The factory default is LOW.

- Switch 8 selects between two different SWITCHING MODES: punch and latch. These will be covered later in this section. For now, just understand that punch mode is optimized for selecting sounds and latch mode is optimized for layering sounds together. (The key word is "optimized." You can certainly layer sounds while in punch mode and select while in latch mode—just not as easily or effectively, especially in live performance.) The factory default is PUNCH.
- **Switch 9** selects between two different MUTE MODES: latch and momentary. In latch mode the mute comes on when the mute button is pressed, and goes off when the button is pressed a second time. In momentary mode, the mute is on for only as long as the mute button is pressed; letting up on the button turns mute off. The factory default is LATCH.
- **Switch 10** determines whether the MUTE INDICATOR LIGHT blinks or is steady when mute is on. This is a matter of individual taste. A blinking mute indicator will draw more attention to itself, which you may or may not want depending on your working circumstances. The factory default is STEADY.
- **Switch 11** sets whether FLASH automatically mutes itself whenever it powers up. For some, automatic mute on power up offers an increased element of safety for ears and speaker cones. For others, it is just inconvenient. Play it your way. The factory default is MUTE ON.
- **Switch 12** selects between two GROUND CHOICES: ground lift and chassis ground. For most applications you will want to leave this setting at the factory default, GROUND LIFT. (Typically you will set FLASH to chassis ground only when FLASH is the first item in the signal chain after a low-level signal source, such as a guitar or a microphone.) *The correct setting is whichever is quietest.*

THE BUS STRUCTURE

While we refer to FLASH as a "1 x 4 stereo" device, it should really be looked on as two separate 1 x 4 passive signal buses. One bus is marked "left" and the other "right" to distinguish between them, but this is just convenient nomenclature. You do not have to use them that way.

It is important to remember that these are passive, not active, circuits. As long as the trim switch is in the **out** position, signal flow in these buses can go in either direction. You could send signal from GROUP A to GROUP B, or from GROUP B to GROUP A. You could even simultaneously send from GROUP A to GROUP B on one bus and from GROUP B to GROUP A on the other. (This flexibility can be quite useful, as you will see when you get to the **Applications** section.) Conversely, when the trim switch is **in**, signal flow in the bus becomes one-way from GROUP A to GROUP B.

The left bus is different from the right bus in that it has one additional connection: the jack on the back of FLASH marked TUNER OUTPUT. This jack can be thought of as an unmutable output jack containing the sum of whatever is selected on the left bus. This is what makes it an ideal tuner output on stage. It also offers creative studio opportunities to engineers.

SWITCHING COMBINATIONS

FLASH can generate 256 different left/right channel combinations, all the way from simple (stereo 1 *or* stereo 2) to complex (like the lefts from 1 and 4 mixed with the rights from 2, 3, and 4). This flexibility gets wild pretty fast: two FLASHs used together as a mixing board expander will give you up to 65,536 different possible audio combinations!

From the front panel or the optional silent footpedal, 16 combinations of four stereo pairs are possible, as follows:

1	2	3	4	GROUP A L/R pairs
–	–	–	–	none on
1	–	–	–	
–	2	–	–	
–	–	3	–	
–	–	–	4	
1	2	–	–	
1	–	3	–	
1	–	–	4	
–	2	3	–	
–	2	–	4	
–	–	3	4	
1	2	3	–	
1	2	–	4	
1	–	3	4	
–	2	3	4	
1	2	3	4	all on

The other 240 combinations are only available over MIDI, though they can also be gotten from the front panel or footpedal with the help of a MIDI mapping accessory. See section 5, **Operation via MIDI**, for details.

CONNECTING FLASH (AND WHAT YOU CAN CONNECT)

The three MIDI jacks on the back of FLASH connect like MIDI jacks everywhere: MIDI In is for MIDI data coming *into* FLASH, MIDI Out is for MIDI data being *sent out* by FLASH, and MIDI Through automatically echoes back out whatever MIDI data is coming into the MIDI In. *If you are unfamiliar with MIDI, we recommend that you read any of the various beginner books and magazine articles that are available on the topic.*

All of the 1/4" jacks on the back of FLASH are unbalanced, so to connect FLASH to most audio gear all you need are ordinary guitar cables. Considering FLASH's audio specs, purists may want to go further and use Monster Cable or some equivalent.

As for which jacks to connect to—GROUP A, GROUP B, or both—different FLASH applications require completely different wiring schemes. Use the information in the **Applications** section as a guide. *As noted earlier, FLASH can handle a wide variety of audio, digital bitstreams, timecode, data, and control voltage signals. For some of these you will have to use adapters in order to connect them to FLASH.*

THE IDEAL INSTALLATION

. . . Is always the one which causes you the least grief. In the case of FLASH, this will depend on what you want to do with it.

If you have only one task in mind, wire FLASH up that way and thereafter leave it alone. If, however, you want to explore a variety of FLASH applications, we recommend that you either:

(1) Keep FLASH out of your rack until you've tested various applications and know what you want to do, or

(2) Put FLASH in your rack, but make sure you can get to the rear panel, or

(3) Best of all: if you have a patchbay, wire every jack on FLASH into it for easy access.

MUTE

The mute on FLASH shuts off all output from the unit (with the exception of the TUNER JACK output) and it shuts it down hard: all the way down to -100dB, assuming an active 0DBM input. This is extremely quiet (nearly twice as quiet as dead silence on a CD, in fact). Mute works in one of two modes, latch and momentary, which will be described shortly. As you will see in the **Applications** section, the mute function turns out to be a surprisingly useful creative tool and utility.

NOISE-FREE OPERATION

When we say that FLASH is quiet, we mean it—quiet when switching, when mixing, when muting, when not in use but still in the audio chain. The curious can find full audio specs in the **Technical Appendices**. The secret behind this quiet is no real secret: just good engineering. The analog and digital elements of FLASH are completely isolated from one another, and all switching and muting is handled through a system of opto-isolated resistors. As our engineering team is fond of saying, "nothing touches the signal but light."

That said, you should be aware of two things:

(1) There *are* situations in which a properly-connected FLASH will appear to make noise while switching, or else increase residual system noise. When these occur it means that there is some wiring, ground, or electrical fault in the network of equipment that FLASH is being used with. The noise will go away when that fault is corrected. (Precisely because it is so revealing of such problems, FLASH can be a handy troubleshooting tool.) For more information on these situations and what to do about them see section 7, **When "Noise-Free" Isn't.**

(2) FLASH's flexibility allows it to be connected and used in ways that could be inherently noisy. Not because of FLASH, but because switching with the wiring patterns in question will result in open traces and unshorted connections. Just how much noise might be generated will depend on external factors – gear quality, local RF interference, grounding, what's connected to what, cable proximity, and so on. We could simply not tell you about these applications, of course, but some of them strike us as too useful to willfully ignore. So instead we will refer to them as what they are: tricky situations that may or may not work, depending on your own circumstances.

SHORTING PLUGS

A useful accessory for FLASH is a set of shorting plugs – 1/4" plugs in which the tip and sleeve have been wired together, so that they short out whatever jacks they are plugged into. Shorting plugs can be used with FLASH to block out noise (in applications such as DAT editing or multiple amp/instrument selection) and to make remote triggering of other gear possible.

Shorting plugs are easy to make. You can do it yourself or have your local service tech do it for you. They are also available directly from Uptown, in 10-plug sets, for $35.00 plus shipping.

SWITCHING MODE REVISITED

Signal switching works in two modes, PUNCH and LATCH.

PUNCH

In PUNCH mode, pressing a button switches that selection **on** and shuts all others **off**. If you want to layer sounds in this mode (that is, select more than one source at a time) you have to press more than one button at once. For example, if you wanted to layer sound 1 with sound 2, you would press buttons 1 and 2 together. Similarly, if you wanted sources 1, 2, *and* 3, you would press buttons 1, 2, and 3. Then if you wanted to go back to just 1 you would press button 1 again, which would leave 1 on and automatically shut 2 and 3 off.

For many applications, punch mode is fine. But not for all things (like one-finger operation). Because of this we added another switching mode called LATCH.

LATCH

In LATCH mode, nothing shuts off automatically. To switch a selection on you press its button. To switch that selection **off** you press the button a second time. In latch mode, one-finger operation is easy: you just press button 1 (turning it on) and then press button 4 (turning it on, too). Latch mode excels at allowing you to do things like maintaining a foundation sound while bringing other sounds or effects in and out against it.

On the other hand, latch mode isn't well-suited for leaping instantly from sound to sound, because in latch mode it takes a press to turn on the new sound and a second press to turn the old one off. Hence the need for punch mode.

It's really quite circular, you see.

HOW TO SELECT THE SWITCHING MODE

There are three ways to select the switching mode for FLASH and any connected footpedals:

(1) Set DIP switch #8 on the FLASH rear panel. When this switch is **down**, FLASH is in punch mode; when it is **up**, FLASH is in latch mode. *The setting of this DIP switch determines which mode FLASH will go into on power-up. The factory setting is PUNCH.*

(2) Step on the optional footpedal's PUNCH/LATCH button to shift from one mode to the other. The yellow indicator LEDs will tell you which mode is currently active.

(3) Shift modes via MIDI. Sending MIDI controller 18 selects punch (value 0) or latch (value 127) for a FLASH set to **low** MIDI response range; while controller 26 does likewise for a FLASH set to **high** MIDI response range.

MUTE MODE REVISITED

The MUTE button does just what you expect: it mutes FLASH, blocking all signal flow except for the TUNER output.

Like buttons 1-4, mute works in two modes. The two modes are LATCH and MOMENTARY.

LATCH

LATCH mode is the factory default. It works the same as the latch mode described above for buttons 1-4: to mute FLASH you press the mute button, and to un-mute you press the mute button again.

This is great, but for applications where you wish to "play" the mute, bringing it in and out quickly, we recommend that you use the other mute mode, MOMENTARY, instead.

MOMENTARY

In MOMENTARY mode, FLASH is muted only for so long as the button is pressed. If you let up your finger, mute instantly goes off.

HOW TO SELECT THE MUTING MODE

There are two ways to select the muting mode for FLASH and any connected footpedals.

(1) Set DIP switch #9 on the FLASH rear panel. When this switch is **down**, FLASH's mute is in latch mode; when it is **up**, the mute is in momentary mode. *The setting of this DIP switch determines whether the mute will be in latch or momentary mode on power-up. The factory setting is LATCH.*

(2) Shift modes via MIDI. Sending MIDI controller 19 selects latch (value 0) or momentary (value 127) for a FLASH set to **low** MIDI response range; while controller 27 does likewise for a FLASH set to **high** MIDI response range.

For your convenience—especially when performing—the switching and mute modes are set separately. They can be in the same mode or not, as you prefer. And since both can be changed via MIDI, it means that you could use a sequencer to automatically change the function of your FLASH or footpedal, as needed, in the course of a recorded take or live performance.

PASSIVE MIXING WITH THE TRIMS

Remember those old good news/bad news jokes? Here we go.

- The good news is that mixing in FLASH is passive: there are no active components in the signal path. This means that FLASH-layered sounds are guaranteed to have only whatever noise and distortion they originally started with.
- The bad news is that "proper" layering (i.e., layering with the highest quality and predictability) requires electrical isolation of the input signals, which causes a 10dB drop in overall FLASH output level.
- The good news is that this drop is easy to compensate for—just turn up the level of FLASH's output at the board, amp, or processor it is connected to.
- The bad news is that layering this way makes the signal flow in FLASH one-directional.
- The good news is that people who want to layer sounds get the benefits of four level-adjustment controls and the certainty that their layered sounds will combine exactly as expected, every time.

On the front of FLASH are a trim button and four level adjustment knobs. The trim button is connected to an audiophile-quality gold-plated switch that inserts a resistor network into the audio bus, providing the needed electrical isolation. When selecting between sounds (but not layering them) the switch should be **out**, so nothing is in the audio path. When layering, it should be **in**.

The overall range of each trim knob is 18dB. Since simply having the trim in cuts signal level by 10dB, this means that trim range is -10dB to -28dB.

If this trim range is insufficient to successfully blend two signals with widely different levels, the level of the higher of the two signals should be reduced using a in-line pad.

THE TRIMS, PART II: AN INTERNAL DEBATE

To trim or nor to trim when layering, that is the question—and even inside the company we have differing opinions.

Al Jewer, FLASH's designer, is completely against layering sounds without the trims. Why? Because if the trim switch is out then the signals being layered are not electrically isolated. This introduces noise and distortion due to impedance and other electrical mismatches, and also results in unpredictable final output levels. Al finds these things completely unacceptable. This is admittedly a purist approach—but coming from the unit's designer it bears a lot of weight.

Freff, Uptown's President, takes a more liberal view. He thinks that giving up bi-directional signal flow is a high price to pay for layering, and that therefore the trim/no trim decision should only be made after real-world experimentation. In his own direct test experience, lots of gear layered badly without the trims . . . but lots of gear also layered just fine. In those cases any noise being induced was too low to be heard by human ears. Some gear actually showed a subtle plus: layering with the trims out seemed to create a mild high frequency boost reminiscent of the effects of an Aphex Type C Aural Exciter. As for output control, Freff found that adjustments to the signal levels coming into FLASH usually took care of any problem.

There you have it. Decide for yourself.

PSYCHOACOUSTIC EFFECTS OF PASSIVE MIXING

You can mix any two sounds together with a standard mixing board: that's a given. It is also a given that the two will sound "mixed"—that is, slightly separate and somewhat degraded in audio quality by all the active electronics they traveled through inside the board.

FLASH's passive mixing doesn't sound like that. Instead of slightly faded, things sound extraordinarily clean. Instead of "mixed," they sound "merged"—sources as different as open-miked environmental tapes and highly-polished studio recordings blend together smoothly into a single sound.

You should, of course, try this for yourself instead of accepting our word on it. All we know is that after running A/B tests comparing FLASH to other mixers in a variety of real-world tasks (multitrack recording, keyboard submixing for MIDI stacks, ambient sound mixing for ADR/Foley work, and a variety of audio post-pro tasks), we are convinced that passive mixing is the only way to go when the highest-possible fidelity is required.

MIDI CONTROL

FLASH has a simple MIDI spec, just enough for what it needs to do, with one additional and very nifty trick: two separate FLASHs can be controlled independently over a single MIDI channel. This is great for saving channels, or for easy control of two FLASHs as an audio expansion pair.

The secret lies in the MIDI RESPONSE RANGE switch on the back of FLASH. When the range is **low**, the unit responds to MIDI Program Changes 0-63 and Controllers 16-20. When the range is **high** the unit responds to Program Changes 64-127 and Controllers 24-28.

The effect of these different commands is hardwired into the unit. In the low range, for example, Program Changes 0-15 pick the 16 possible combinations of stereo pairs (from all off to all on and everything in between); while 16-31 and 32-47 repeat these patterns for the left and right audio buses, respectively; and 48-63 turn individual jacks on and off. Getting all 256 possible audio combinations out of just 64 MIDI Program Change commands is done, therefore, by combining commands in pairs. Want everything on except for the left channel of signal #4? Send either Program Change #15 (all on) followed immediately by #59 (#4 left off), or #27 (#1-2-3 left on) followed by #47 (all right on). Both will do the job.

For a complete chart of all Program Changes and what they do, see APPENDIX 2.

The various Controllers that FLASH responds to govern switching modes and the MUTE function. Controller #7 (MIDI Volume) is a global MUTE that affects any FLASH on a given MIDI channel. Controller #15 serves as an alternate program change command, with values 0-63 and 64-127 controlling FLASHs set, respectively, to low or high MIDI response range. Finally, in each of the low and high MIDI response ranges there are five Controllers that work as separate mutes for the left and right channels, a mute toggle, and selectors for the different switching and mute modes.

FLASH can switch and mute up to 100 times a second in response to MIDI. This so fast, it turns out, that many sequencers can't keep up. When you push them to send out MIDI data as fast as you might want for certain FLASH effects, these sequencers begin to drop balls in their internal juggling act. They hiccup, or stutter, or otherwise lose timing accuracy, and FLASH sounds like it isn't switching accurately. The real truth is that FLASH is switching very accurately indeed (despite appearances) – and that is is the MIDI data that has gone wonky.

The fix in these cases is generally to upgrade the raw power of the hardware your sequencer is running on. We have seen timing problems with Mac Pluses but never Mac IIs, with 8088 PC clones but never 80286 machines, and so on.

REMOTE CONTROL

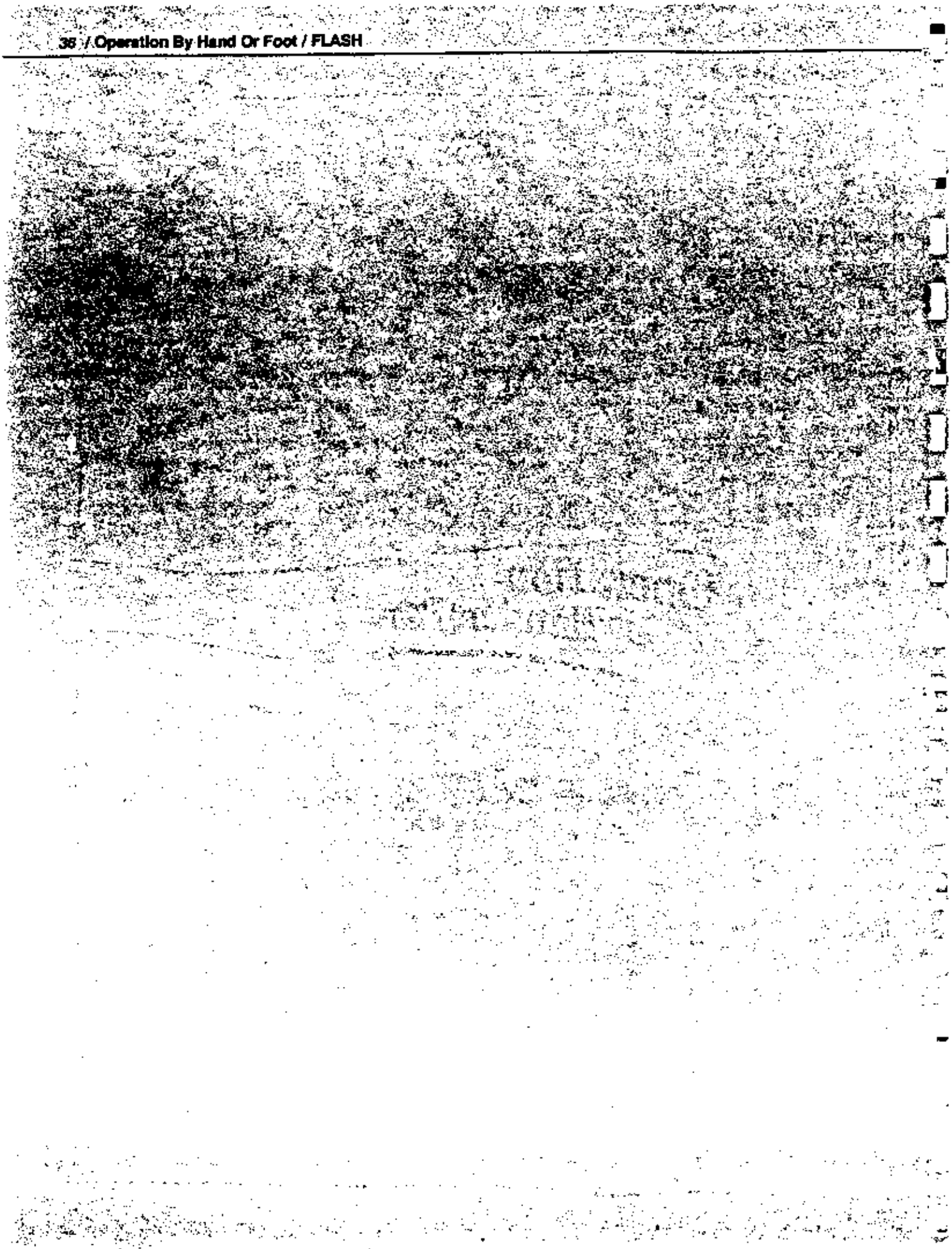
FLASH can be remote-controlled in two ways:

(1) One or more optional silent footpedals. Up to six of these footpedals can be chained off the remote jacks on a single FLASH, with a maximum of five footpedals in a single chain. The footpedals duplicate FLASH's front panel switching and muting controls, and add another button which selects switching mode.

(2) A hand-operated remote built from the do-it-yourself schematic in the **Technical Appendices**. This is exactly like the optional footpedal except that it also adds a button for selecting mute mode. *We will manufacture a hand-operated remote ourselves if there is enough demand. Meanwhile, the technically-minded can whip up their own from the schematic. It isn't difficult.*

4

Operation by Hand or Foot



TURNING FLASH ON AND OFF

To turn FLASH on, press in the silver half-circle on the front left of the unit.

To turn FLASH off, press it again.

SYSTEM SET-UP

To connect a footpedal to FLASH, run the supplied 8-pin DIN cable from the REMOTE jack on FLASH to the SOURCE jack on the footpedal.

Footpedals can be chained together by connecting their SOURCE jacks to the REMOTE jack of the previous footpedal in the line. Up to five remote footpedals may be chained together.

Up to six footpedals (total) may be attached to one FLASH, using both front and rear REMOTE jacks on that unit.

All footpedal power is supplied by FLASH.

INPUT LEVELS

As a general rule (and certainly for best signal fidelity), you want the inputs to FLASH to be the hottest non-distorting levels available. You can always reduce a level using FLASH's trims or other attenuation downstream in the signal path.

In the case of signal input levels which are too far apart to balance with FLASH's trims, an in-line pad should be used to reduce the level of the highest signal/s.

> **GUITARISTS, PLEASE NOTE:** Given a choice, you should always run line level instead of guitar level. And you should keep your guitar turned up as much as possible in order to reduce noise.

AVAILABLE SIGNAL COMBINATIONS

16 possible stereo pair configurations are available from the front panel or a footpedal, from all off to all on. *240 more combinations are possible over MIDI.*

SWITCHING

There are two switching modes, PUNCH and LATCH.

IN PUNCH MODE

To select a single stereo pair (from 1-4), press the appropriately-numbered button on FLASH's front panel or any attached footpedal. The LED above the button will light up and the switching readout next to FLASH's on/off button will display the selected number.

To turn off this selection, press any of the other switching buttons.

To select two or more stereo pairs together, press their buttons at the same time. The switching readout will show the letter **L**, for **Layer**.

IN LATCH MODE

In LATCH mode, switching selections do not automatically go off when other selections are made. To turn off a selection you must press it a second time. This means that you do not have to press buttons at the same time in order to layer stereo pairs together.

If no stereo pairs are selected, the switching readout will show a dash, like so: –

CHANGING THE SWITCHING MODE

To change switching modes from FLASH, you must flip rear panel DIP switch #8. Move the switch **down** for punch mode and **up** for latch mode.

To change switching modes from an attached footpedal, step on the far-right button marked SWITCHING MODES. Mode status is indicated by the two yellow LEDs above the button.

USING THE TRIM SWITCH AND THE TRIMS

For most selecting, the trim switch on the front panel should be **out**. For most layering (see mini-debate on page 32) the trim switch should be **in**.

When the trim switch is in, two things occur:

(1) There is a 10dB drop in overall FLASH output. To compensate for this drop you should increase gain at the input stage of the unit that FLASH is routing signal to.

(2) The four trim knobs become level controls, one per available stereo pair. Each trim offers an additional 18dB of attenuation.

The trims are hand controls only. Their levels cannot be stored as presets or altered via MIDI.

MUTING

Mute silences all rear panel FLASH outputs except for the one marked TUNER OUTPUT, which carries the sum of whatever is selected on the left bus.

There are two mute modes, LATCH and MOMENTARY

IN LATCH MODE

To mute FLASH's output, either press the mute button on the right front of FLASH's front panel or step on the footpedal button marked M. The LED above these buttons will light whenever FLASH is muted.

To turn mute off, repeat the action.

IN MOMENTARY MODE

In MOMENTARY mode, mute is active only as long as the mute button is pressed down. When it is released, mute goes off.

CHANGING MUTE MODES

To change mute modes from FLASH you must flip rear panel DIP switch #9. Move the switch **down** for latch mode and **up** for momentary.

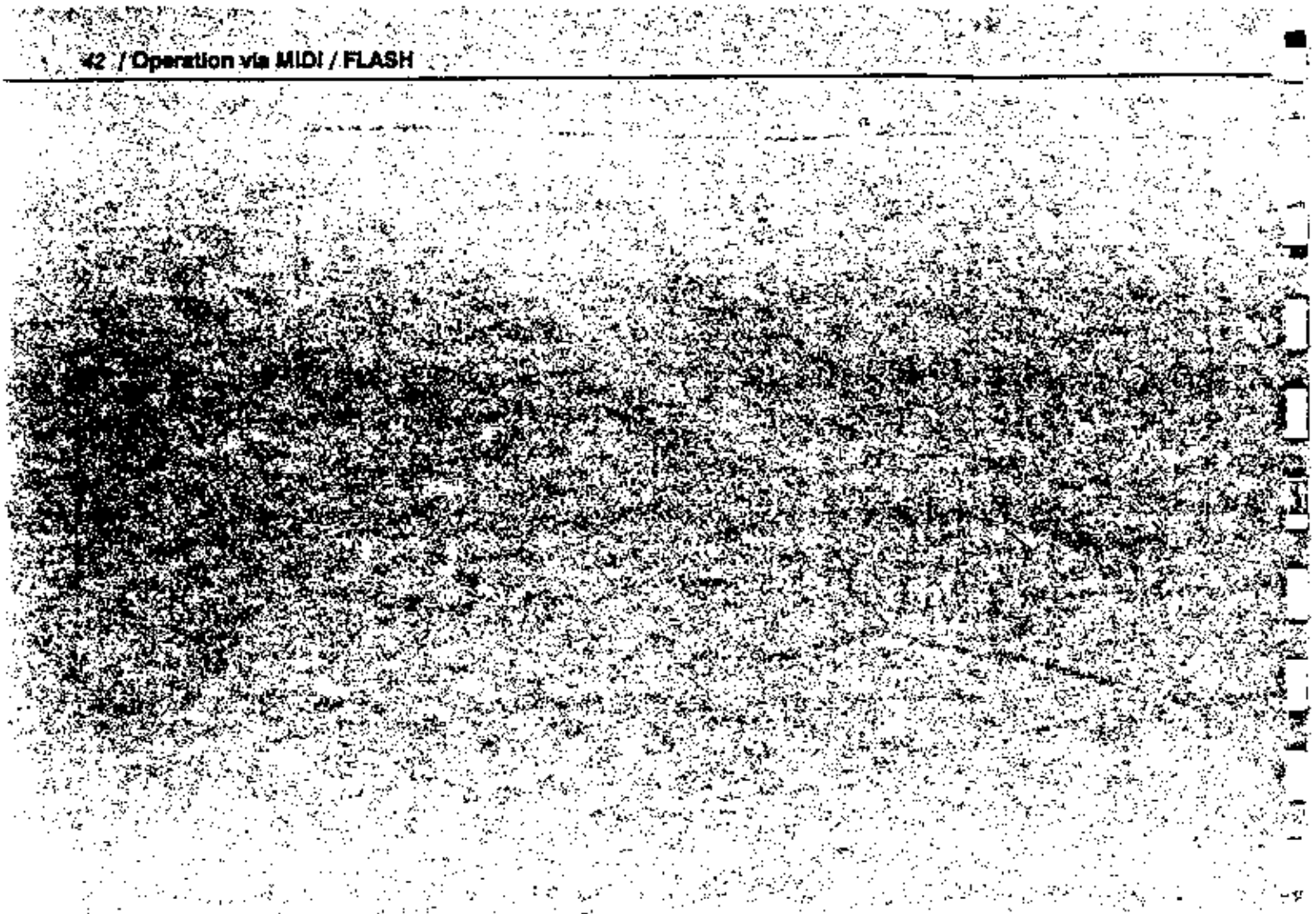
DEFAULTS

The rear panel DIP switch is used to set various operating defaults for FLASH. Switches #8-12 deal with non-MIDI matters. #8 (SWITCHING MODE) and #9 (MUTE MODE) were discussed above. The remaining switches are:

- #10: MUTE LIGHT. Flip this switch **down** to make the mute indicator LED blink whenever FLASH is muted, or **up** to make the LED shine steadily.
- #11: MUTE DEFAULT ON POWER-UP. Flip this switch **down** if you want the mute off whenever FLASH is turned on, or **up** if you want the mute automatically on.
- #12: GROUND CHOICE. Flip this switch **down** for ground lift, or **up** for chassis ground. *Ground Lift is recommended for most applications. Chassis ground is generally recommended for applications in which FLASH is the first item in the signal chain after a low-level source, such as a guitar or a microphone. THE CORRECT SETTING IS WHICHEVER IS QUIETEST.*

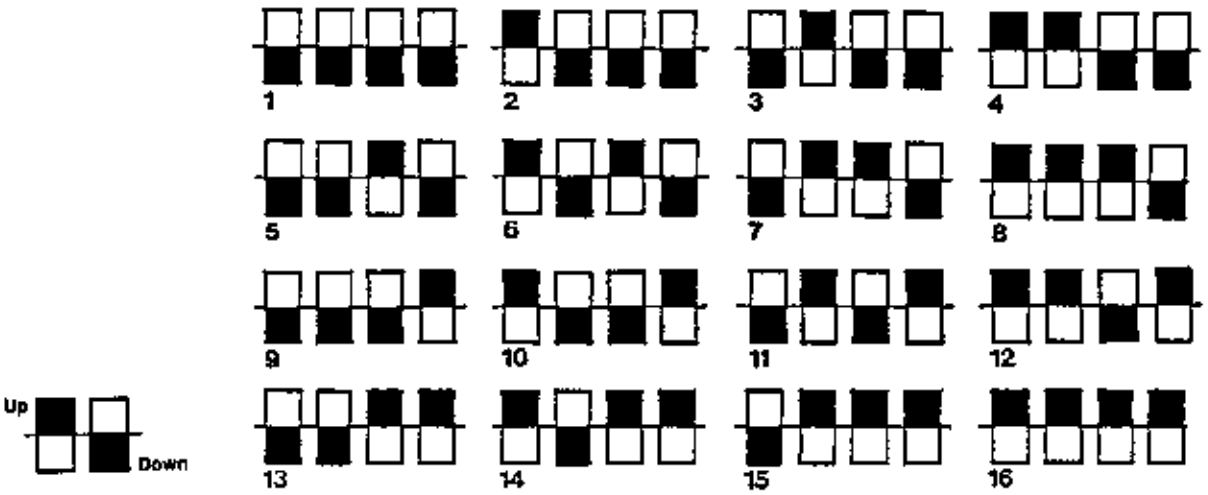
5

Operation via MIDI



SETTING THE MIDI CHANNEL

The MIDI channel that FLASH receives and sends on is set using the first four DIP switches on the rear panel.



SETTING THE MIDI RESPONSE RANGE

Two FLASHs may be controlled independently on one MIDI channel by setting one to a **low** MIDI response range and the other to a **high** MIDI response range. This choice is made using DIP switch #7 on FLASH's rear panel. Move the switch **down** for low and **up** for high.

The low range includes Program Changes 0-63, Controller 15 (values 0-63), and Controllers 16-20. The high range includes Program Changes 64-27, Controller 15 (values 64-127), and Controllers 24-28.

Controller 7 (MUTE ON/OFF) affects units in both ranges.

THE MIDI DATA INDICATOR

Whenever FLASH receives any MIDI data (except for Active Sensing and MIDI Clock), on any MIDI channel, the MIDI DATA indicator dot in the front panel will light up. This lets you know whether or not data is getting to the unit. If it is, but FLASH is still not responding, check to make certain that your choice of MIDI CHANNEL and MIDI RESPONSE RANGE are correct.

SWITCHING

256 possible signal combinations are possible via MIDI. 16 of these can be obtained using single Program Change or Controller 15 commands. The other 240 can be obtained by using selected *pairs* of commands.

A complete chart of these switching commands is included in **Appendix 2, MIDI Implementation**. Here is a summary:

- The first set of 16 Program Changes and Controller 15 values in a given MIDI response range select the 16 possible stereo pairs, from all off to all on.
- The second set of 16 Program Changes and Controller 15 values repeat this pattern, **but only for the left bus.**
- Likewise the third set of 16 Program Changes and Controller 15 values, **but only for the right bus.**
- The remaining 16 Program Changes and Controller 15 values in a given MIDI response range work a little differently. They do not effect entire buses. Instead, they turn jacks on and off individually.

In MIDI-controlled switching combinations, each stereo pair can be in one of four states:

(1) Both jacks off (LED off).

(2) Left on, right off (LED blinking slowly).

(3) Right on, left off (LED blinking rapidly).

(4) Both jacks on (LED steady).

READING THE LEDs

The LED indicator scheme described above is a perfect example of "what you see is what you've got." It shows *exactly* which channels are active and which are not. Confusion sometimes arises, however, when what you've got is not exactly what you were expecting . . .

Remember: the right bus commands effect only the right bus, the left bus commands effect only the left bus, and the individual jack commands effect only those individual jacks. Because of this the LED action usually isn't determined by the switching command you are sending, but by the *combination* of that command with the previous one. For example, if everything was selected and you sent the command for LEFT 1 ON, no LEDs would change because nothing in the switching did – everything would still be on. But if they were all off when you began, then that same LEFT 1 ON command would get you one slowly blinking LED. Same program number, different visual result, because the starting context was different.

Here's another example: watch the LEDs while stepping up and then back down through all the program changes in a MIDI response range. The pattern of how they turn on, off, or blink will be different going in different directions.

HOW TO CHANGE THE SWITCHING MODE

To change the switching mode via MIDI, send either Controller 18 (low MIDI response range) or Controller 26 (high MIDI response range). Any value from 0-63 selects PUNCH mode. Any value from 64-127 selects LATCH mode.

MUTING

To mute FLASH via MIDI, send it a Controller 7 command with a value of 0.

To unmute FLASH via MIDI, send it a Controller 7 command with any value from 1-127.

To mute and unmute the left bus, send either Controller 16 (low MIDI response range) or Controller 24 (high MIDI response range). Any value from 0-63 will mute the bus, while any value from 64-127 will turn it back on.

To mute and unmute the right bus, send either Controller 17 (low MIDI response range) or Controller 25 (high MIDI response range). Any value from 0-63 will mute the bus, while any value from 64-127 will turn it back on.

HOW TO CHANGE THE MUTE MODE

To change the mute mode via MIDI, send either Controller 19 (low MIDI response range) or Controller 27 (high MIDI response range). Any value from 0-63 selects LATCH mode. Any value from 64-127 selects MOMENTARY mode.

TOGGLING THE MUTE

Controllers 20 (low MIDI response range) and 28 (high MIDI response range) are *mute toggles*. Their values don't matter—just the presence of these commands in the MIDI data going to a FLASH will, with one exception, turn mute on (if off) or off (if on). The exception comes when one bus is muted while the other isn't. In such a case, a mute toggle command turns mute off for *both* buses. If you are interested in using rapid on/off muting as an effect—see the **Applications** section for some interesting ideas in this regard—a stream of Mute Toggle controllers could be the best way to go.

LOCAL CONTROL

DIP switch #5 on FLASH's rear panel turns Local Control on and off. Move this switch **down** for off and **up** for on.

The primary use of this function is to allow you to trigger some of the 240 MIDI-only switching combinations from FLASH's front panel or any connected footpedal. Doing this will require the addition of a MIDI-mapping device to your setup.

The procedure is as follows:

(1) Decide what switching combinations you want, and figure out what MIDI commands will call them up.

(2) Program a MIDI mapping device to send out these commands in response to Program Changes 0-15.

(3) Connect the FLASH's MIDI Out to the mapping device's MIDI In and vice-versa.

(4) Turn Local Control off using DIP switch #5.

With local control off, FLASH will not switch in response to its own controls. It will send out MIDI data, however, and switch in response to the remapped MIDI commands that it received back from the mapping device.

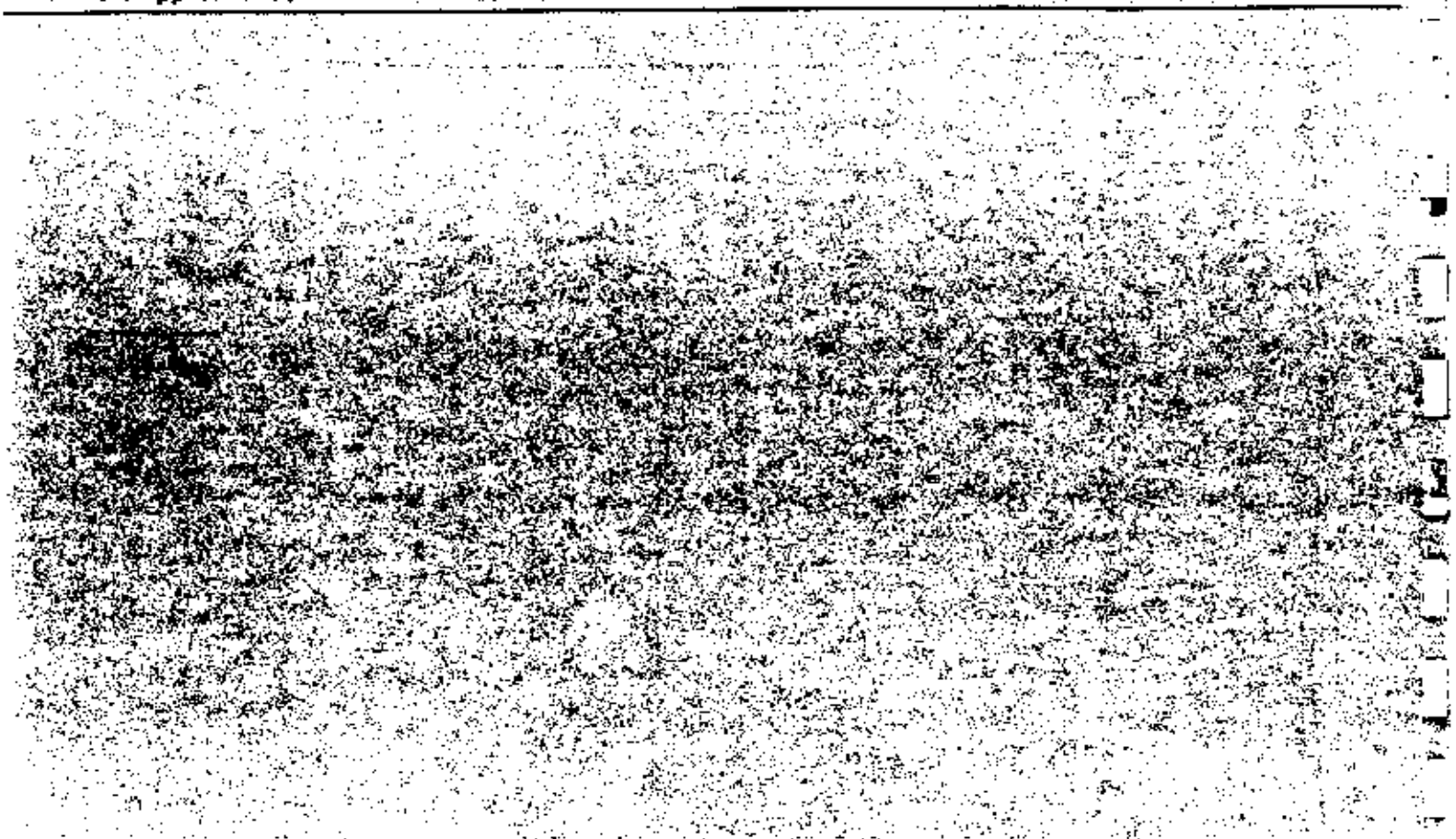
REMAPPERS, PLEASE NOTE: There is some potential for confusion with this procedure, since the LEDs will light up in response to the remapped MIDI command, not the switching selection that you made. When local control is off it is perfectly reasonable to step on button 1, say, and see buttons 3 and 4 light up instead. (If you didn't know it was remapped you might think your FLASH was broken!)

MIDI MERGE

DIP switch #6 on FLASH's rear panel controls MIDI MERGE. Move this switch **down** to turn MIDI merge off and **up** to turn it on. When merge is on, all MIDI data received at FLASH's MIDI In port is included with the MIDI data being sent over FLASH's MIDI Out. The sole exception is Active Sensing, which FLASH filters out of the data stream (thank goodness).

6

Applications



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INTRO TO APPLICATIONS

FLASH can be applied to many different tasks, as this section makes abundantly clear. But before we dive into the idea pool we should take time out to note three important things:

(1) Just because FLASH can do something doesn't mean that it is the *best* tool for that specific job. We would never claim that. However, it may be that you don't own the ideal tool, or else that said tool is already in use, stretched to its limits, or in for repair—in which case FLASH might be handy indeed.

(2) Some of these applications are completely noise-free. Others offer some risk of noise due to the wiring schemes involved. **The latter are clearly marked.** Try them if you like, but do be aware of the risks. It is possible that some of these applications simply will not work for you in your situation.

(3) This section of the manual is loosely organized. Very loosely. The decision to do it this way was half deliberate and half unavoidable. On one hand we wanted to spur your own FLASH creativity by slamming different ideas together. On the other hand, we frankly couldn't figure out which applications were most important. That decision, as always, rests with you.

These are only some of the tricks we've thought of. New applications are being tested in the lab right now, and we expect that FLASH users around the world will discover even more. If you come up with a new application in the course of your work, please contact us so we can share the news.

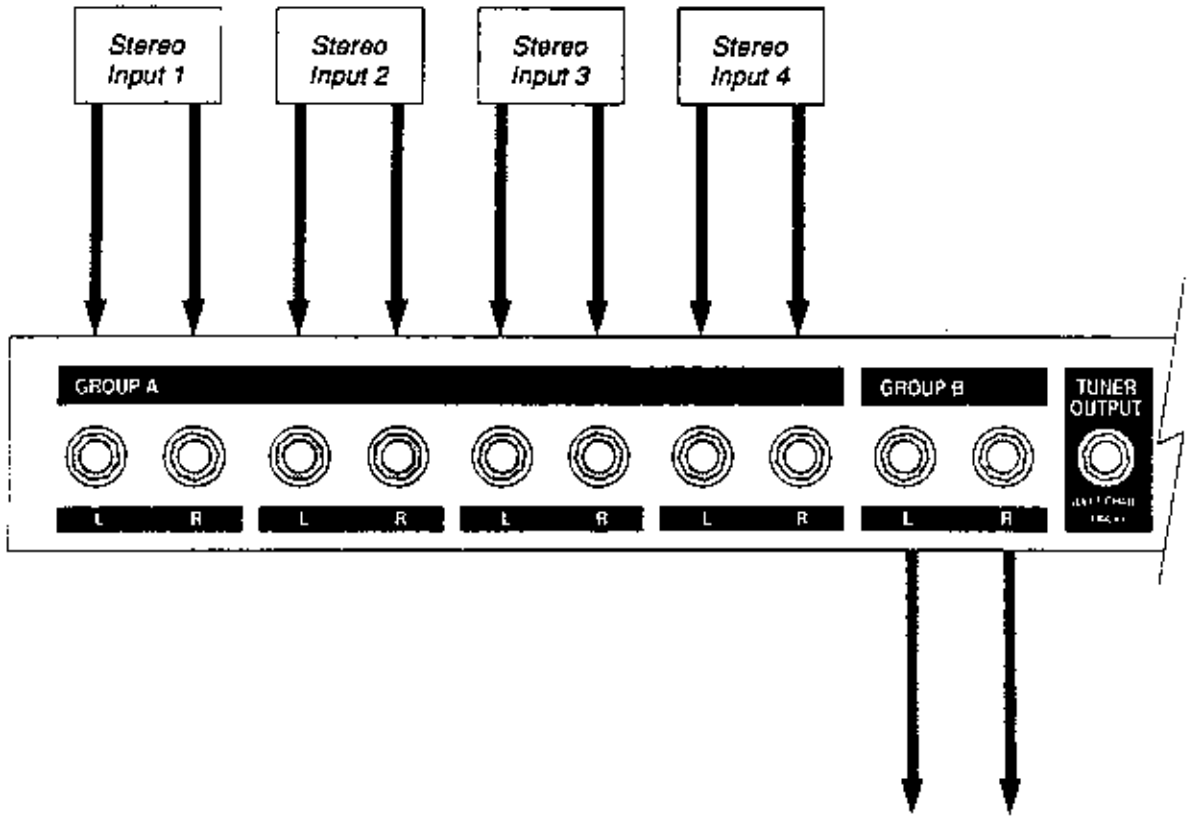
. . . And if you haven't sent in your warranty card, do so now, so you can be one of the people we share the news with!

BASIC 4 IN/1 OUT STEREO AUDIO SWITCHING

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

In this generic application four stereo signals go into the GROUP A jacks and a single stereo signal comes out GROUP B. The signal path can also be looked at as two separate mono buses – left and right – each with four ins at GROUP A and a single out at GROUP B.

Switching from the front panel or the silent footpedal allows you to select any one of the four pairs at a time. Switching via MIDI gives you 16 possible pairings of the individual left/right inputs. As for what those inputs might be, anything audio goes: guitars, keyboards, sound modules, microphones (with adapters), effects devices, CD players, tape decks, mixing boards, etc. We will highlight specific tricks with these pieces of gear as we move through this section.



To effects device(s), amplifier(s), PA, mixing board, tape recorder, home stereo, etc.

BASIC 4 IN/1 OUT STEREO AUDIO LAYERING

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

This generic application is wired just like the previous one – four stereo signals go into the GROUP A jacks and a single stereo signal comes out GROUP B. As with switching, any audio input will work. But instead of simply switching from one pair of jacks to another, when layering you also mix signals together. For most layering, as noted in the Basics section, the trim switch should be in.

Layering from the front panel or the silent footpedal allows you to select 16 different combinations. Layering via MIDI allows you to select 256 different combinations.

If the trim switch is in, the trims give you 18dB per channel of attenuation control over the four pairs of Group A jacks. (This level control can be combined with MIDI selection to create some useful effects that will be highlighted later in this section.)

THE BEAUTY OF PARALLEL EFFECTS

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

Layering makes it easy to reproduce, live, all those remarkable composite sounds that are normally created by submixing a group of tracks in the studio. You know – straight guitar plus DDL plus reverb plus an edge of distortion in *parallel* instead of chained in a row. No more running your signal processors in serial and listening in horror as a great studio effect turns to stage mud. Let all that end; there's no question in our minds that parallel effects are better than serial effects 99% of the time. For proof just listen to sweep-picking on a highly-distorted guitar (mud), then again on that same guitar with its clean signal mixed back in parallel (genius). Or try listening to three stereo chorus signals parallel (yum), then the same three running one into another (yuuch).

MULTIPLE EFFECT LOOPS

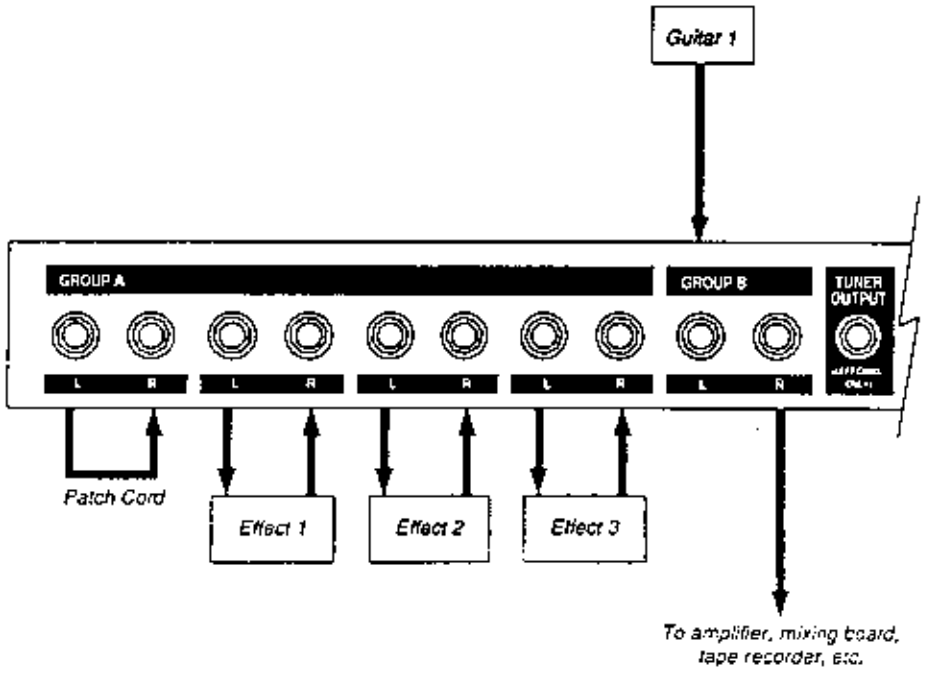
TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

This application is the purest indicator of FLASH's bi-directional signal path. To set it up you route an input through one of FLASH's audio buses, process the signal outside the unit, then bring it back through the remaining bus. An example: bring a signal in GROUP B left, take it out all four GROUP A lefts, run each of these signals into an individual processor, run the processor outputs into the GROUP A right jacks, and take the final signal out of GROUP B right. Presto! A 4-loop selector.

Of course, you don't have to run all four as loops. One or more of those Group A outputs could go off to a signal processor, amplifier, mixboard, tapedeck, or whatever, and never come back to FLASH at all.

In this mode the trim button should be OUT and you should only switch, not layer. As described, it is a mono application. To get stereo effect loops you would have to use two FLASHs at the same time, one each for the left and right channel signals.

Those interested in layering multiple loops should see the LAYERING LOOPS application note on page 96.



STOP THE PRESSES

Thanks to Jason Klagstad and the guitar team at Cascio Music, in New Berlin, WI, we have discovered that using FLASH as a noiseless multiple loop selector can be either simple and quiet or tricky and noisy, *depending on the gear that is being looped.*

There are two problem situations to be aware of:

(1) **Putting an ultra-high signal gain box all by itself in a loop.** (Some examples: the Boss Distortion-Sustainer pedal, Rockman Sustainer, or a Korg A3 that has been set to its "Jimi" patch).

(2) **Putting a high-gain box on one loop while also using a piece of bare wire for a clean bypass loop.**

For more details on these two situations and how to deal with them, see the appended TECH NOTE section at the end of this manual.

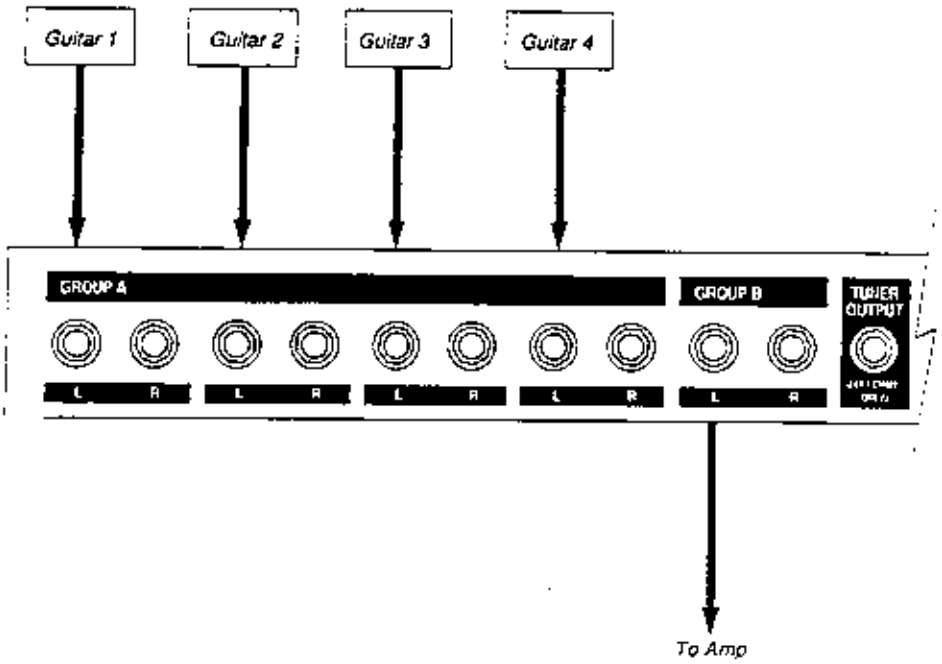
RESUME THE PRESSES

1-OF-4 GUITAR SELECT

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

This was the second-ever FLASH application we discovered, back when we supplied a prototype to Sammy Llanas of the Bodeans. Sammy needed to use four guitars during the course of a show, and was tired of the time, hassle, and noise risks involved in constantly unplugging from and plugging into his amp. FLASH and a silent footpedal provided an elegant solution: now Sammy keeps all four guitars plugged into FLASH, FLASH plugged into his amp, and all problems at bay. When he wants to shift guitars all he has to do is put the old one down, pick up the new one, and step on the right button.

For guitarists who want to do this the left bus is better than the right, because the left bus is connected to the tuner output. But you could always use the right bus at the same time for more instruments and another amp, or for another player, or even for some entirely different FLASH application that only uses a single bus.



1-OF-2 AMPLIFIERS SELECT

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

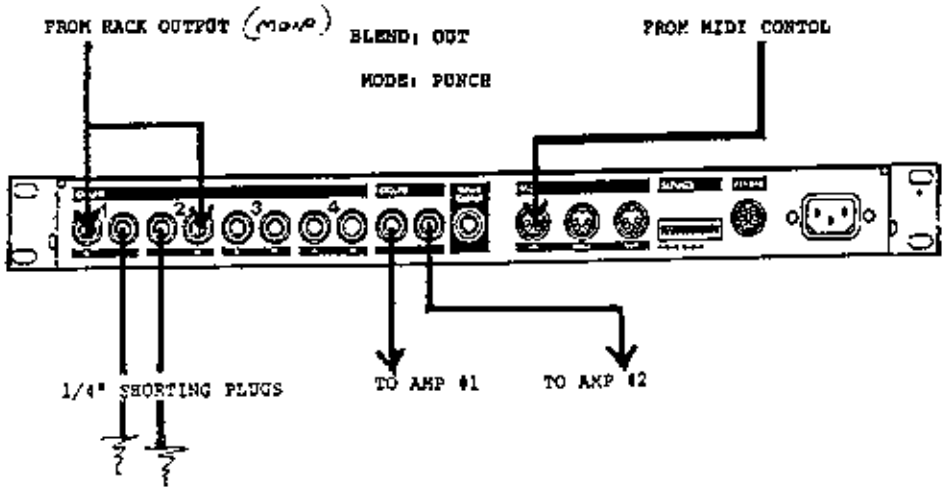
This application will connect any source – typically a guitar – to either of two amplifiers. Split the source signal and run it into 1 LEFT and 2 RIGHT in GROUP A. Put shorting plugs into 1 RIGHT and LEFT to keep the signals isolated. Then connect GROUP B LEFT to amplifier #1 and GROUP B RIGHT to amplifier #2.

When you select 1 from the front panel, footpedal, or MIDI, your signal will be routed only to amplifier #1. When you select 2, likewise, it will go only to amplifier #2.

Option: To get both amps together, leave everything as already described but add two more splits which are connected to 3 RIGHT and LEFT. Now selecting 1 will get you amp #1, 2 will get you amp #2, and 3 will get you both.

Some serious stage fun could be had here by using MIDI to switch your sound back and forth between two widely-spaced amps. A solo that starts on the left and jumps to the right? Or from front to back of the hall? Choppy chords that move spatially in time to the song, as well as rhythmically?

TECHNICAL NOTE: If you are concerned that splitting your signal two (or four) ways will weaken it, don't worry. This wiring scheme does not load signal. When a jack in FLASH is off, it is *off*.



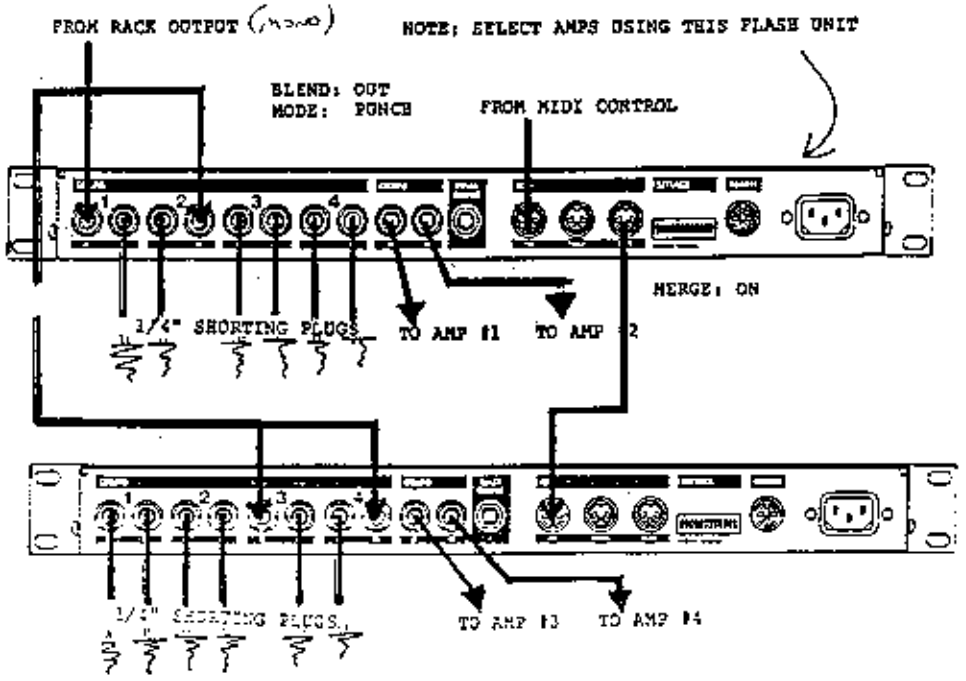
1-OF-4 AMPLIFIERS SELECT

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

This application uses two separate FLASHs and MIDI to create a bigger network of possible amplifier choices (quad surround-sound, anyone?).

Start by splitting your source signal in four ways. Two source signals plug into LEFT 1 and RIGHT 2 on the first FLASH, while the other two connect to LEFT 3 and RIGHT 4 on the second FLASH. All other GROUP A jacks on both units get shorting plugs (you will need 12 of them). The GROUP B LEFT and RIGHT on FLASH #1 go to amps #1 and #2, respectively, while the same jacks on FLASH #2 got to amps #3 and #4. To complete the wiring scheme, connect your MIDI source (footpedal, sequencer, or whatever) to the first FLASH's MIDI In jack and the first FLASH's MIDI Out to the second FLASH's MIDI In, then turn MIDI MERGE on in the first FLASH. Done.

This setup operates a lot more simply than it connects. Pick either 1, 2, 3, or 4 on the first FLASH and you'll get amps #1, #2, #3, or #4 respectively. Whatever amps are not picked are automatically shorted out in this arrangement, and therefore silent.



JOHN HENRY WAS A MIDI-DRIVEN MAN

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	MIDI
NOISE RISK	low

Using MIDI to control the switching makes it easy to create effects that would be literally impossible to do any other way. Here's just one example, accomplished in our lab with a guitarist, a guitar, three different effects, a CD player, FLASH, and a sequencer. FLASH's job in all this was to select among the outputs of the three effects and the CD player.

With the sequencer we sent a slow, repeating pattern of program changes to FLASH, while the guitarist played in tempo. Because of the program changes, each note he played had a different timbre—one was chorused, the next distorted, the next reverberant, the next whatever was on the CD (*Jeff Beck's Guitar Shop*) at the time. We kept pushing the tempo up and up until the poor man's left hand was going as fast as it could on the guitar neck—pure heavy metal wet dream—and still each individual note had its own character. It sounded incredible.

It could have been any player, of course, not just a guitarist, and it needn't have been so radical: imagine the same effect using four subtly different reverb or distortion settings. (As for keeping up with the speed demons out there, no problem. Via MIDI, FLASH can switch smoothly up to 100 times a second. The speed demons will give before FLASH will.)

SWITCHING WITH THE TRIMS IN FOR LEVEL CONTROL

TRIM SWITCH	in
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

Here's a neat trick: do switching (not layering) but keep the trim button in anyway. The benefit is that you gain volume control over each of the switched signals. This can be used in lots of ways:

- Stepping up or down to pre-arranged levels, such as one for rhythm and one for leads.
- Tailoring the outputs of old effects devices that don't have level controls.

- Creating an "amplitude shimmer" of varying degrees by rapidly switching back and forth between the same sound at different levels. (We'll talk more about this effect later in this section.)

GUITAR MONO DIRECT WITH EFFECT LOOPS

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

This application is wired the same as for the multiple effects loops described earlier, with one minor variation: run one of the loops straight back into FLASH. Doing so will give you three selectable effect loops and one *absolutely* clean signal, because on that loop there would be nothing between input and output but bare wire. This offers a big audio advantage over the bypass modes in virtually all signal processors, since even in "bypass" they still degrade your signal by running it through an obstacle course of active electronic components.

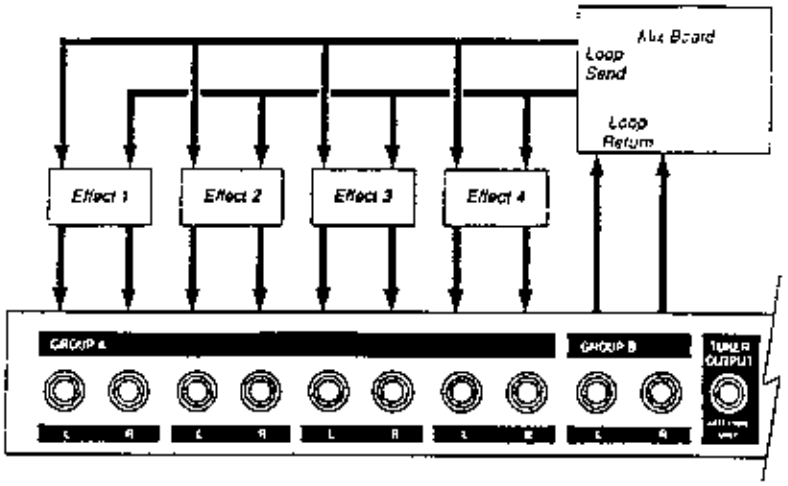
MIXBOARD (OR KEYBOARD MIXER) STEREO EFFECTS LOOP LAYERING

TRIM SWITCH	in or out
SWITCHING MODE	either
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

In this application, the effects send of a mixer is split and sent to four different stereo effects. The outputs of these effects are routed into FLASH, which is used to play selection and layering games with the 256 possible combinations of input channels. With MIDI, of course, these combinations can be automated.

Variations: use eight mono effects instead of four stereo effects (or some combination of both), used chained effects in place of single effects, cross-connect to any amps or signal processors with effects loops, use two mixers that have only mono send/returns, etc.

Another interesting possibility lies in returning one or both of FLASH's outputs directly to mixer input channels, instead of the loop return. This would allow you to use FLASH's trims and the mixer's send level controls to create controllable feedback loops, depending on what was switched where at any given time.



MIXBOARD EXPANSION

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

Using a single FLASH you can greatly increase the flexibility of your current mixing board. Some possibilities include:

- Recombining multiple outputs from a mixing board to be sent back into the board, or elsewhere.
- Layering and switching differently-processed versions of one stereo output from the board.
- Using FLASH as an external submixer to supply extra-clean additional inputs to the board.
- Bypass and patch-point re-routing. Example: submixing a group of channel bypasses and plugging them into another channel.
- Sending channel outs to places in the board that they normally can't go.

We see these uses as major grief-savers for people with small or limited mixing consoles and P.A. boards, especially when you consider that MIDI control of FLASH allows them all to be automated.

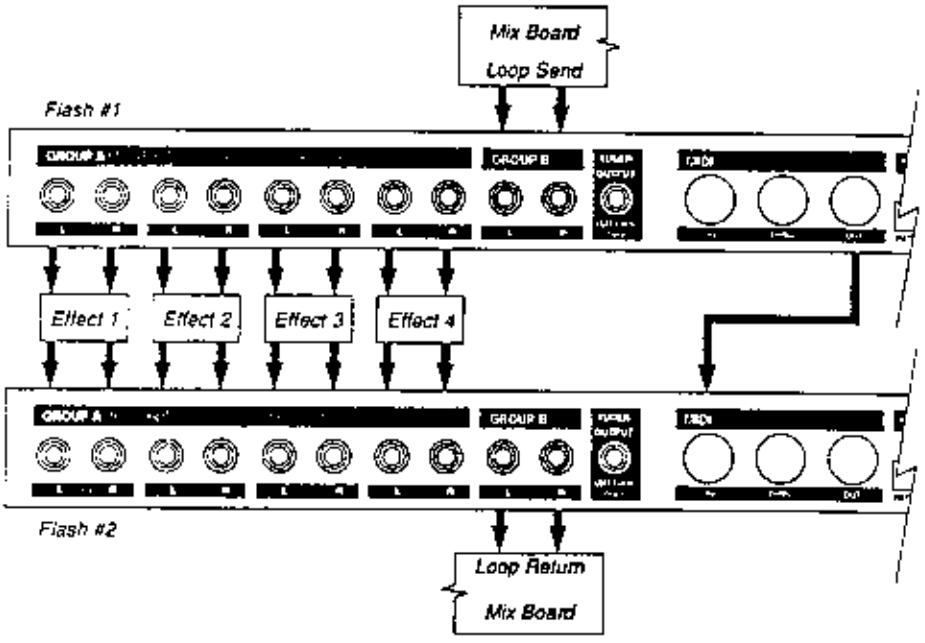
MORE MIXBOARD EXPANSION (THE BIG TIME)

TRIM SWITCH	in on 1st FLASH & out on 2nd
SWITCHING MODE	either
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

This is a (considerable) extension of the previous idea. It takes two FLASHs to pull off. The first FLASH is used to split out a stereo signal and route it to multiple processors, while the second FLASH layers or switches the results and returns them to the board. You should set both units to the same MIDI channel and make all selections from unit #1.

At its simplest, this arrangement can turn one effects send into four. Would you like an effect send/return that gives you something more than plain vanilla? Okay, how about a send that had reverb on the left, another reverb with a slightly longer delay on the right, and a low-level aural exciter straight up the middle? This approach can be used to do that and a whole lot more.

Taken to the max this arrangement offers **65,536** possible audio choices where there used to be only one. The potential boggles our mind and we can't wait to hear what creative engineers do with it.



FOOTSWITCH TRIGGERING

TRIM SWITCH	out
SWITCHING MODE	either
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	none

In this application FLASH takes over—and via MIDI, automates—the triggering of almost anything that use a standard short-to-ground footswitch control. This includes amplifier channels, older effects devices, lights, sequencer tempos, delay lengths, punch in/out controls on a tapedeck, program advances on a synthesizer, and lots more.

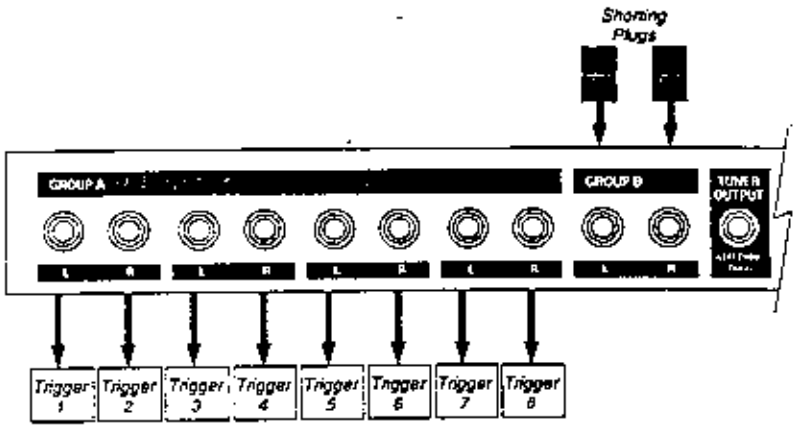
Step 1: Place shorting plugs in the GROUP B jacks.

Step 2: Run cables from the GROUP A jacks to anything that takes a footswitch trigger—your amp's channel selector, your synth's program advance jack, your tapedeck's punch-in/out, your pre-MIDI lighting gear, and so on.

Step 3: Select a jack, any jack. When you do so you will short the connection to ground and the device on the other end will be triggered.

To get individual control over all eight possible outputs you will have to use MIDI; from the front panel and the silent footpedal you'll only be able to handle four at a time (or all eight as four pairs). Remember that you don't have to use both buses for this at the same time. You can always use one bus for footswitch triggering and the other for something else—just leave out one of the shorting plugs.

GUITARISTS, PLEASE NOTE: It just so happens that a Mesa Boogie pre-amp has eight footswitch input jacks, making FLASH the perfect unit for automating it.



MIDI VOLUME CONTROL (OF SORTS)

TRIM SWITCH	In
SWITCHING MODE	either
MUTE MODE	either
CONTROL	MIDI
NOISE RISK	low

Here is a crude but effective way to gain limited MIDI volume control over devices that do not accept MIDI volume. Split the signal of the device you wish to control in four separate ways, and connect them to the GROUP A jacks on FLASH. Then push the trim switch in and use the trim knobs to adjust each signal to a different volume level – low, middlin', higher, and highest. Switching among these four via MIDI will give you four selectable volume levels; while layering them in different combinations will give you 16.

Since 90% of what is done at a mixboard involves moving a fader between pencil ticks that mark two different levels, this application should provide more than enough control for most situations.

MULTI-EFFECTS LOOP EXPANSION (MONO)

TRIM SWITCH	out
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

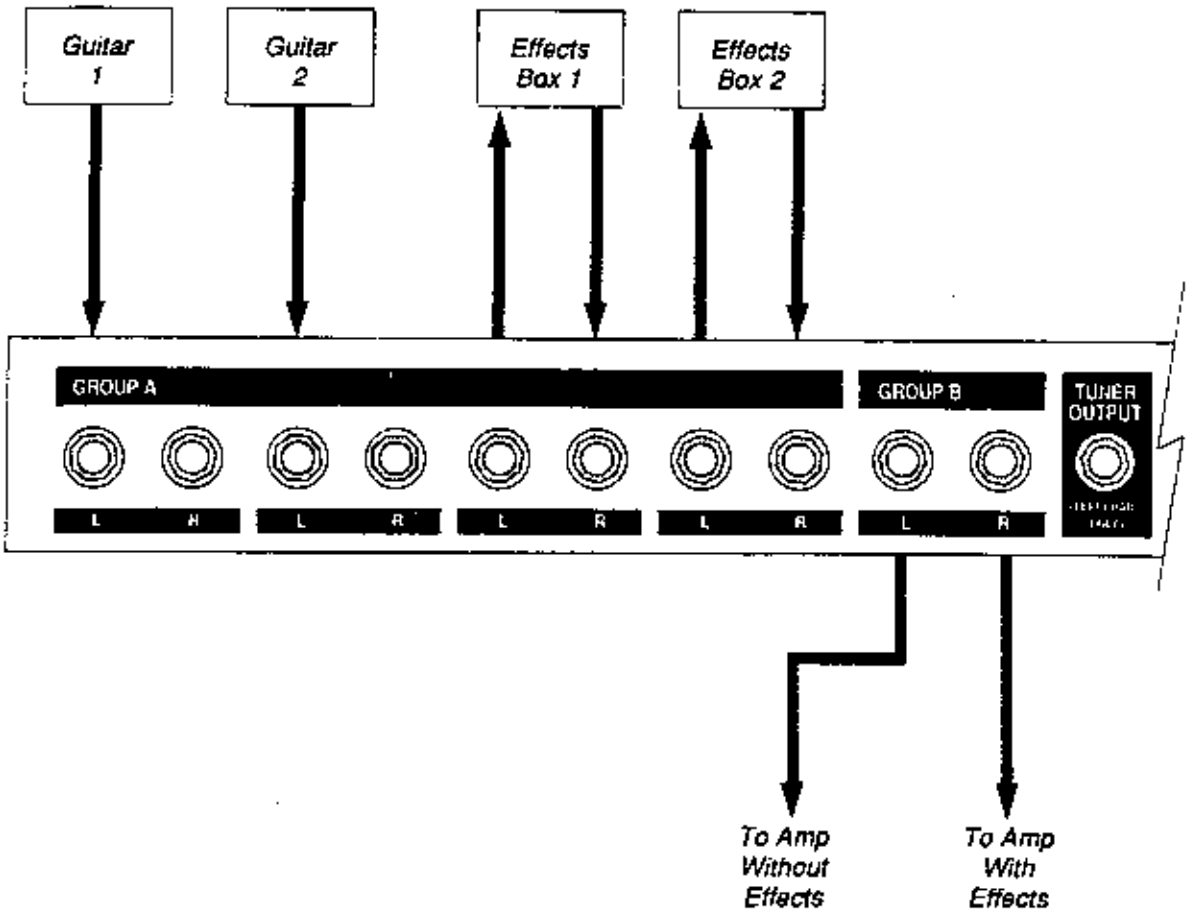
In this application, FLASH becomes an expander for the external effects loop in a multi-effects device. As shown in the diagram, it can turn one loop into four. But it could also be used as a way of feeding entirely new inputs to the multi-effect at that point in it own signal-processing chain. For multi-effects with stereo sends and returns, two FLASHs can be used together as a stereo expander.

1-OF-2 GUITAR SELECT PLUS 1-OF-2 MONO EFFECT SELECT

TRIM SWITCH	out
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

In New York a gigging music store salesman asked us if FLASH could be set up to give him instant access to either of two guitars and either of two effects loops. That was his current stage setup and that's what he wanted. Our answer: of course it could, and here's how. He even gets an unexpected bonus in the form of two outputs—one with effects and one without.

We recommend using this application in latch mode, so that you don't accidentally shut off your effect loop when you change selection of a guitar (or vice-versa). It could be used in punch mode, but the dance you'd have to do to step on the buttons would probably be distracting.



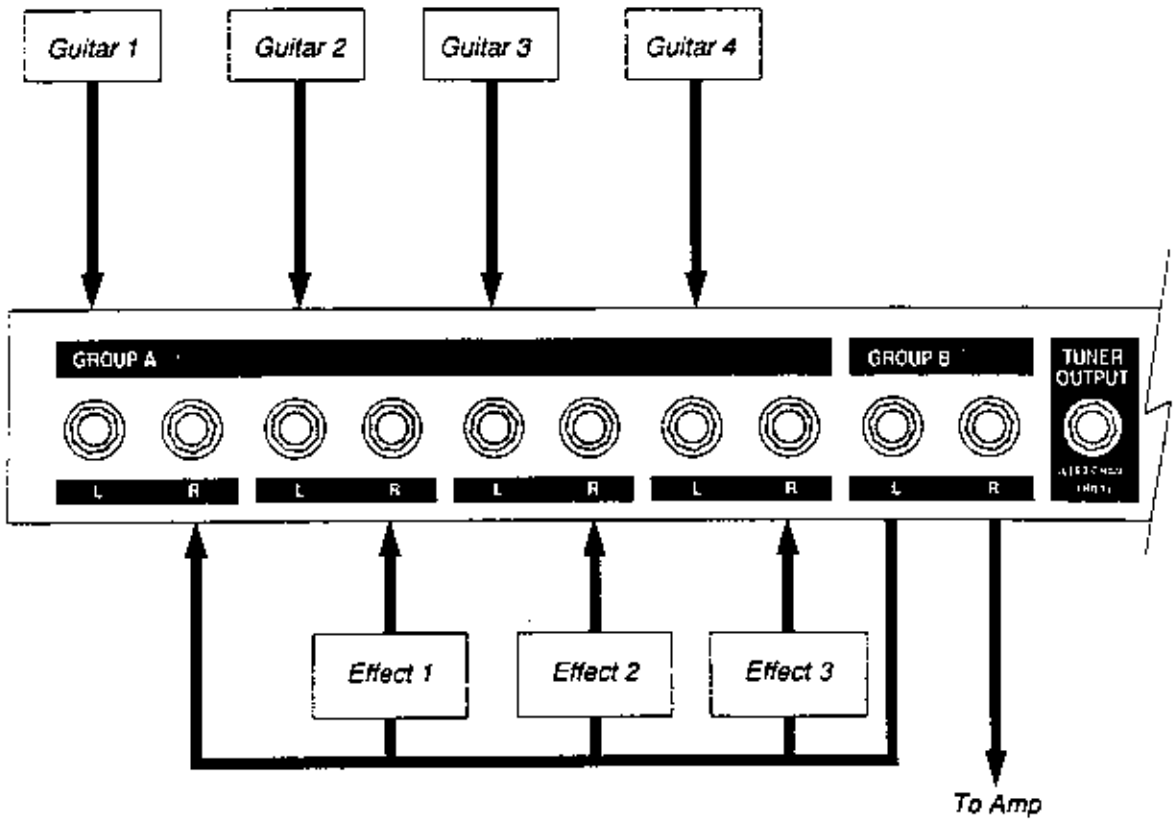
1-OF-4 GUITAR SELECT PLUS 1-OF-4 MONO EFFECT SELECT

TRIM SWITCH	out
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	MIDI
NOISE RISK	low

This application is based on the same concept as the previous one, but uses MIDI to take it farther: with it you can select any of four separate input sources and four separate effects loops. All it takes is using one side of GROUP A for the inputs, splitting the same side of GROUP B as the output to the loops, processing at will, bringing the signals back through the remaining side of GROUP A, and taking final output from the remaining jack in GROUP B.

This setup uses FLASH in only one direction, but loops the signal back from one bus to the other. In order for it to work the trim button *has* to be out.

To get everything available to you in this setup will require MIDI control. But if you want, the first two inputs and effect loops are still available under front panel or footpedal control.



BASIC MUTE GAMES

The MUTE on FLASH is immediate, total, and musically more useful than we'd ever dreamed. It was originally designed so that players could mute their main outputs and still tune their instruments using the signal from the TUNER OUTPUT jack. As it happens, nobody who tested it ever stopped there. Instead they:

- Muted FLASH, played power chords, then un-muted and let the sound slam into you like a wall.
- Shot up to the stratospheric peak of a solo and then muted. This dropped everything into total silence, which felt a lot like being slammed into a wall in reverse. (It sounded particularly cool when reverb was added *after* FLASH's output.)
- Used the mute to chop up their phrases rhythmically. This was particularly effective on Talking Heads-like material, especially when the mute chops created polyrhythms against what was being played.

MIDI can make all these things programmable. It can also push the mute to extremes, turning it on and off as fast as a hundred times a second, to a point where the on/off chattering blurs together and sounds a little like an old-style ring modulator.

MIXBOARD MUTING

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	low

Even great mixboards harbor noise. Using one or more FLASHs you can mute inputs or outputs that aren't in use and considerably lower that noise. We know one engineer who was going to bite the bullet and buy $300 noise gates for each channel in his board, just to be able to mute at will, until he encountered FLASH's ultra-quiet mute and greater flexibility.

For this application we recommend that your FLASH (or FLASHs) be fully wired into the studio patchbay. You mixboard muting needs will change depending on the music being recorded or mixed.

SMPTE SWITCHING

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	none

Here's a wild one. Are you running a multi-media project with different timecode sources? Or do you just want to take one timecode source and drive many different things with it?

FLASH to the rescue. For a 1 x 4 SMPTE through box, just run SMPTE into GROUP B and out GROUP A. For a SMPTE switcher hook it up the other way, bring your different timecode sources into GROUP A and out GROUP B.

Switching SMPTE through FLASH is quite possible to do on the fly thanks to the design of most professional SMPTE-based equipment. Part of the design spec is that such gear should ignore SMPTE messages that are scrambled or incomplete, and wait for the next sensible message with an intact end of message bit before doing anything. Therefore if FLASH cuts a message in half at the switching point it doesn't really matter, as long as the next stream of data gets through.

For an amusing proof of the above thesis all you have to do is record several different SMPTE tracks, each with a different start point, on different channels of your multitrack. Then use FLASH to switch between these channels on playback, sending the results to a SMPTE-driven sequencer.

DIGITAL BITSTREAM SWITCHING (PCM AUDIO, AES/EBU, & OTHER)

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	none

Right up front we'll tell you that this is *not* for real-time audio work: it's for automating the routing between digital sources and targets in a studio. As such, it is almost stupidly simple.

What's involved? The same wiring schemes as for standard switching, layering, and loops, depending on what you want to achieve, plus whatever connector-adapting you must do to plug your digital bitstream cables into FLASH.

There are six things to keep in mind:

(1) FLASH can't handle fiber optic outputs.

(2) The current crop of digital gear doesn't lock to new signals fast enough (it still takes about a second) to allow you to switch from one source to another in real time.

(3) Switching only. No layering; the bits don't work that way.

(4) Connector quality is *very* important here; poor connectors can screw up bit-accuracy and prevent this application from working. (Gold-plated connectors are definitely recommended.)

(5) For DAT-to-DAT work, the receiving machine (or machines) should ideally meet SCMS (Serial Code Management System) standards.

(6) FLASH is *not* a data rate converter. You could certainly use FLASH to connect a 44.1KHz source to a 48kHz target, but the routed data wouldn't be understood on the receiving end.

DIGITAL ENGINEERS, PLEASE NOTE: Because bitstream data is sent in encoded stereo, each of FLASH's jacks can handle a single stereo bitstream.

STOP THE PRESSES (WHAT, AGAIN?)

We've learned more about digital bitstream switching since we wrote the note on the previous page. Mostly what we've learned is that it is very tricky and machine dependent . . . even more so than we originally thought it would be (and that was already plenty).

Here's intrepid West Coast Uptowner Dave Hill to tell you about it in his own words, since he's the brave soul who has been bashing away at the application tests:

> "When we tested digital bitstream switching with PCM audio at Mark Waldrep's studio it worked fairly well. But when we tested the same application using DATs, at the DAT Store in Santa Monica, we had considerable trouble getting a machine to receive data and lock on. Scott Ikier, who works there, believed that the word clock was having difficulty getting through. Using coax cables with gold-plated connectors helped, but still the only DAT machine that would reliably receive the data was the Denon DTR 2000, which is pretty expensive. Neither the Sony 55ES, Sony 75ES, or NEC KD1000 would lock on – though a Pioneer D900 did manage to lock on with sporadic dropouts.
>
> "Later I talked about this problem with engineer and consultant Lee Furr, in Tucson, Arizona. His take on it was that it was a collective problem – that the output impedance of the DAT machine, combined with other factors such as the resistance of the connectors, the capacitance of the cable (especially my admittedly cheap patch cords), and the slight distortion of FLASH's switching optos, all combined to distort the square waves of digital audio more than the majority of tested receiving machines could handle."

Thanks, Dave. Clearly this application is an iffy one that requires further research. We promise news bulletins as they occur.

VOICE LAYERING AND SUBMIXING FOR KEYBOARDS AND ELECTRIC DRUMS

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

Let's talk three things here: the demands of working live, the quality of your sound, and how to increase your available inputs without getting rid of your existing mixer.

WORKING LIVE

One place where MIDI has never really worked for keyboard players and electronic drummers is in the realm of live master control. We speak from direct experience. The vast majority of the time what you want is to hear a specific synth or sampler or some specific combination of same, and that's all. Anything more complicated (and keeping track of a master controller's pre-programmed "zones" and "setups" and what-the-heck-is-on-what-MIDI-channel-anyway certainly qualifies as complicated) is too much to deal with when the gig throws you an unexpected curve, as gigs always do.

FLASH replaces all that with simple and flexible control. Just put everything in your setup on the same MIDI channel and drive it all together, all the time, using FLASH to switch, layer, and gate the audio outputs as needed. You will never hear anything you don't want to hear, you won't have to remember anything complicated, and you can throw sounds together and apart whenever you feel like it, without additional programming.

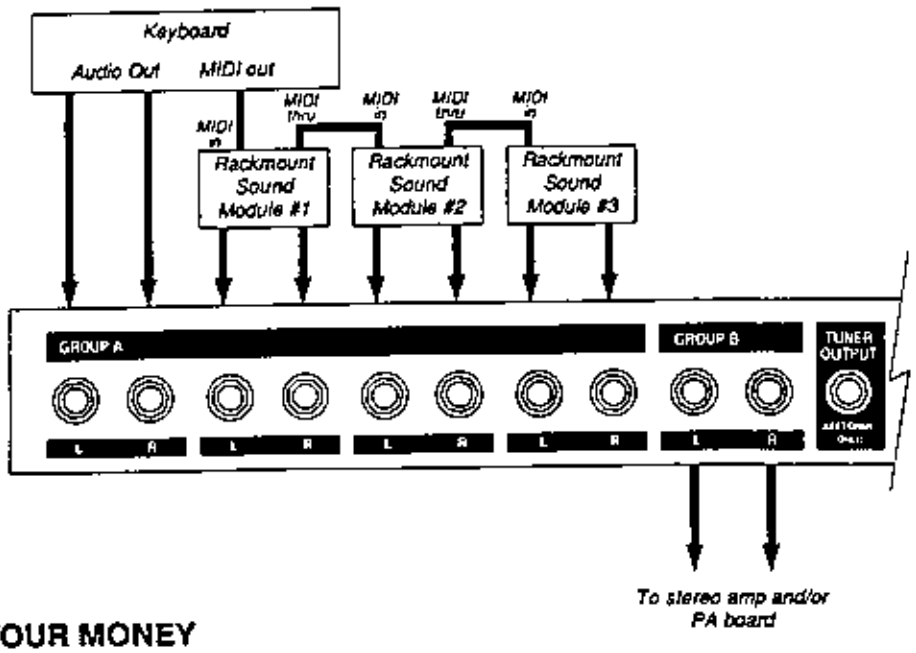
Better still, layered sounds won't be plagued by the MIDI delays that typically come from replicating note and controller data over several MIDI channels.

SOUND QUALITY

Having spent lots of money on synths and samplers, we turn around and blur their sound by running them through active mixers: some cheap, some expensive, but all of them full of complex wiring and active audio components. What makes this particularly perverse is that we don't use 95% of the features in these mixers, so we pay twice – once for things we don't need (or use) and again in the degradation of our original sound.

Don't trust us on this. Try it for yourself. Use FLASH to mix your sounds together and see if you don't agree that more of what you bought those synths and samplers for is getting through to your ears.

Think about it: with the trim switch in, the most that FLASH adds to the signal chain is a single resistor. With the trims out, it adds *nothing*. Having worked for several months this way in our own performances, there's not a chance we're going back.



MORE INPUTS FOR YOUR MONEY

So maybe you actually need some of your current mixer's features. Okay. Don't scrap it: expand it. A little 8-in mono mixer, which can handle four stereo sources, could be connected to four FLASHs in order to create a submixing system with 16 stereo inputs, programmable mutes in advance of the board electronics, and more.

KEYBOARDISTS AND ELECTRONIC DRUMMERS, PLEASE NOTE: Though admitting it is a blow to the ego, guitarists are as far ahead of you when it comes to audio switching as you are ahead of guitarists on MIDI. But FLASH can help bring both camps up to speed.

WORKING WITH MULTI-TIMBRAL, MULTI-OUTPUT SYNTHS

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

This application represents a specialized kind of submixing, to be done on a per-instrument basis. The concept is to use FLASH's routing, switching, layering, and MIDI automation to expand the usability of synths and samplers with either multiple or multi-timbral outputs.

A "SAMPLE-AND-HOLD" FOR THE '90s

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

A trick we used to do with our Prophet 5 was to hold a chord and switch patches, creating an effect not unlike earlier "sample-and-hold" features on modular synths. We also did much the same with the "timbre-scan" feature on our Apple II-based Alpha Syntauri system. With MIDI and multiple keyboards it is easy to play whatever you feel like, keep everything on the same MIDI channel, and have FLASH shuffle through different timbres as you go. This is a rich and useful effect.

KEYBOARDISTS, PLEASE NOTE: This can't be done with MIDI alone. It takes MIDI and a FLASH together.

FOLEY/ADR/POST-PRO AUDIO MIXING

TRIM SWITCH	In or out
SWITCHING MODE	either
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

One of the nice things about passive mixing is that it doesn't so much mix sounds as merge them together, creating the impression that there was only a single source in the first place. This psychoacoustic effect and FLASH's considerable switching, layering, and muting capabilities combine to make FLASH a powerful tool for engineers working in movie and TV sound.

In Automatic Dialog Replacement (ADR) work, for example, FLASH could be used to great effect. It's switching is silent, so the audience won't hear it cutting in and out. Its own noise floor is so low it won't add anything to what's going on. And, finally, the "welding" effect means that any reasonably recorded voice track can be pre-mixed with an ambience track and slipped into place much more smoothly.

For Foley work, where environmental ambience is often assembled out dozens of raw tracks, and microphones must record sounds as quiet as hands rubbing on corduroy, FLASH's audio specs make it an ideal submixer.

For both of the above, and video/film post-pro, FLASH is an inexpensive and effective input or output mute that can be locked to SMPTE control via a MIDI sequencer. It can also be SMPTE-locked to shift from one level to another automatically, using multiple identical inputs and the trims. POV indoor view, one level; POV outside the window looking in, another. And the currently complicated process of assembling environmental sound tracks by hand, or mixing CD and DAT effects, can be greatly simplified. Every punch-in that can be avoided is one less subtle unreality to hide from the audience's ears.

Here's an expert example from Alan Howarth, a Hollywood composer and sound effects man whose credits include both *BACK TO THE FUTURE* sequels:

> "I go through great pains with my sequencer to create environment tracks. Say I wanted to add bird noises: the problem with sampling a bird call and triggering it is that every time you come back to that sample the same bird chirps. What you want instead is to run long things in the background and open up and close down on them. What people do right now is create long tracks by going through a lot of punch-ins, submixing, and other editing. All of that adds noise. But with FLASH I could do all of that noiselessly. And I could take a simple source – like that bird call example – and blur it out, make it more complicated and naturalistic, by looping it out from FLASH into various DDLs and other

effects. Or forget samplers – just sit there with a FLASH, four CD players, and lots of sound effects CDs, assembling things on the fly. Use two FLASHs tied together and you could be assembling from among eight stereo sources. You could build stereo A/B tracks and switch between them in real-time instead of spending hours with a sequencer or even more hours with a razor blade and quarter-inch tape. That would be very slick."

AUDIO FOR VIDEO EDITORS

TRIM SWITCH	in or out
SWITCHING MODE	either
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

Credit where credit is due. This tip originally came to us from Audio Engineering Associates, in Pasadena, California.

In similar fashion to that described for the previous application, FLASH could be used for real-time and programmable switching, layering, and muting of effects, dialog, and music in a video-editing suite.

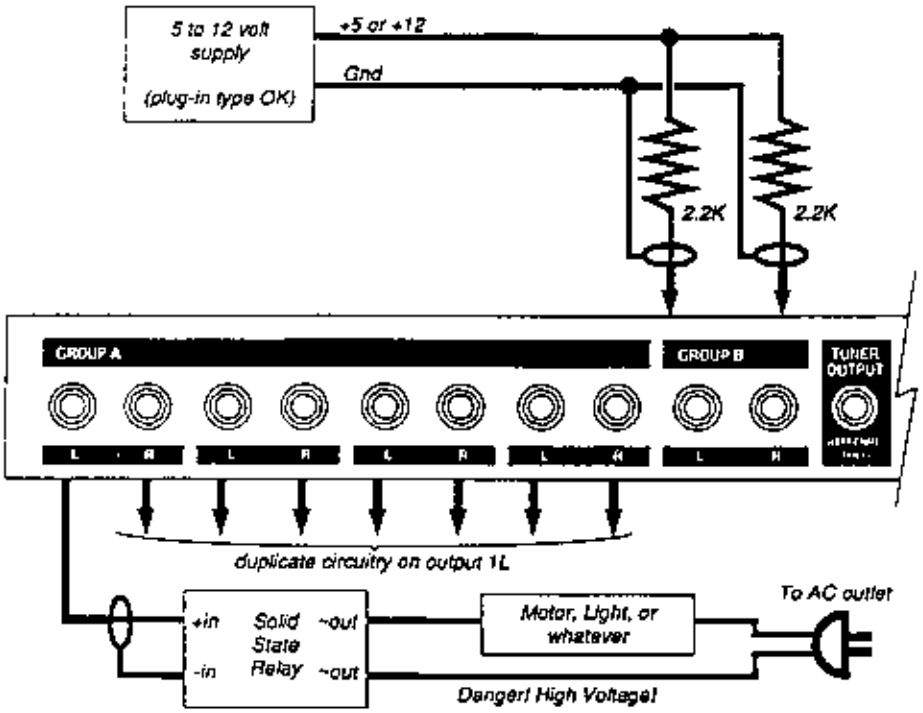
MIDI-CONTROLLED VIRTUALLY ANYTHING (ANYTHING AC, THAT IS)

TRIM SWITCH	out
SWITCHING MODE	latch
MUTE MODE	not relevant
CONTROL	manual or MIDI
NOISE RISK	none

Because FLASH's circuitry is passive it can handle an incredible range of signal voltages, from microphone level on up to 50 volts. Not much wattage, mind you – you should stay under a tenth of a watt, so no amplifier outputs! – but certainly the complete range of normal control voltages used in synths and effects. Add an appropriate power source, some 2.2K resistors, and some relays as shown in the diagram below, and FLASH can be used to turn on and off anything that runs on AC power. This means potential MIDI automation of such things as motors, fans,

lights, darkroom timers, home stereos, flashpots, smoke machines, baby bottle heaters, slide projectors, VCRs, television screens, bubble machines, toasters, EKG machines, coffee grinders, anything. We foresee some wireheads out there who are going to have serious fun.

An alternate setup would be to use only one bus for this application and use the other for any other single-bus application you please.



CONTROLLING MODULAR SYNTHS

TRIM SWITCH	in or out
SWITCHING MODE	either
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	none

There are still people using modular synths out there—like us—and since FLASH can handle control voltages, three applications come straight to mind: (1) Using FLASH to split and sum module outputs and inputs in ways not allowed in the synth's stand-alone design; (2) Using MIDI program changes to provide limited automation of the synth's patch routings; amd (3) Multing a single voltage source into all the GROUP A jacks, then use the trims and different layering combinations to automate sending selected control voltage levels into the synth.

CONTROLLING VOLTAGE LEVELS FOR AUDIO-VISUAL/MULTI-MEDIA

TRIM SWITCH	in or out
SWITCHING MODE	either
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	none

This is another voltage-layering game. If you create different voltage levels through layering and send them to rheostat-controlled lights, you can do anything from automating the house lights to programming crossfades between different slide projectors.

PROGRAMMABLE AUTOPANNING

TRIM SWITCH	in
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	MIDI
NOISE RISK	low

Okay. So FLASH can switch between multiple separate signal sources. That's great. But what advantages do we get if we use it to switch between multiple identical sources?

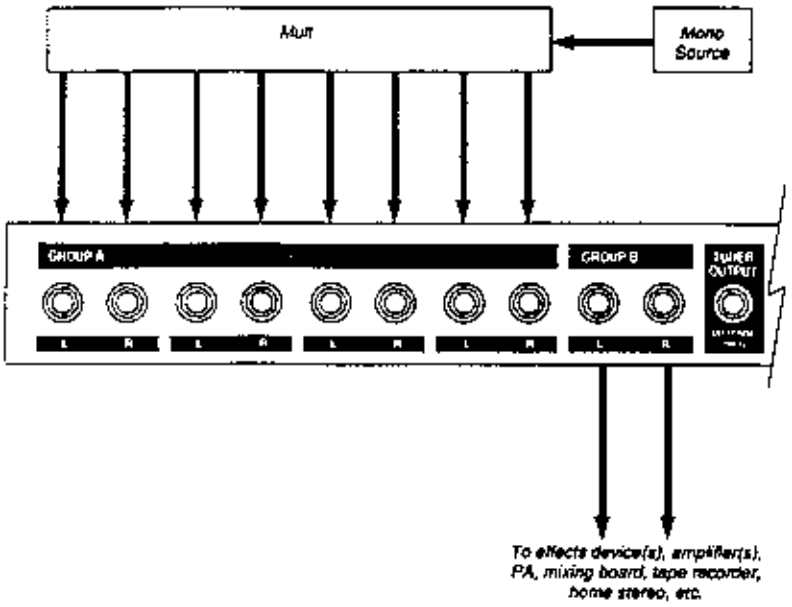
We get programmable autopanning, that's what.

Here's the trick: take a mono signal and split it eight ways. Run all eight into the GROUP A jacks, push the trim switch in, and then adjust the trims so that each pair of jacks is at a distinctly different volume. Selecting and layering pairs from the front panel at this point would generate an interesting range of additive volume levels, but all the signals would be dead up the middle. Selecting and layering via MIDI, however, allows us to put together pairs from jacks *set to different volumes*—and that means stereo pan control. With some experimentation you should be able to get 16 or more different and programmable stereo positions out of this setup.

Once things are set up, several interesting variants become available.

(1) Mute one bus or the other. Depending on which one you mute, and the volume differential between the two, you will get spatial jumps of various sizes.

(2) Move the trims by hand. Depending on how you have things set up you should be able to play some interesting games with the stereo position, presence, and "spread" of a sound, depending on what trims you move and how far you move them.



RESURRECTING OLD EFFECTS AND PEDALS

TRIM SWITCH	out
SWITCHING MODE	either
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

We don't know about you, but for years our closet has been full of old gear, including lots of effect pedals that we stopped using long ago – not because they didn't have useful sounds, but because we didn't have a good way to integrate them with our newer equipment. Enter FLASH. Now we don't have to worry about signal path degradation, or cumulative noise, or how things sound when scrunched up in serial order, or remembering to turn effects on and off. We simply nailed all our old boxes down on one board and put each one on its own loop, using a FLASH for central routing. When we start work we turn everything on full and then use FLASH to pick, choose, and combine the ones that we want to hear.

The truth, now. It was only Freff who attached his old pedals to a board. Al Jewer – who plays out more than Freff does – rackmounted all of his and built in a permanent AC supply.

ADDITIONAL STAGE MONITOR MIXES

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	manual
NOISE RISK	low

There are rarely enough sends from the house mixing console in a club or auditorium to supply the individual state monitor mixes that are needed. FLASH can be used to greatly expand board capabilities in this direction.

AUTOMATING GUITAR PICKUP SELECTION

TRIM SWITCH	in or out
SWITCHING MODE	either
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	low

This application requires having a tech go in and rewire your guitar, so you shouldn't do it lightly, but what the heck—if you are automating your rig why stop at the stuff in your rack? Why not go all the way and pull individual outputs off each of your pickups, send those outputs to FLASH? The advantages you would gain include automating your pickup selection and vastly increasing the number of ways you could combine and process your outputs. Want the combined sound of reverb on one pickup with the other clean? This is how to do it.

MAKING AMPS QUIETER (SOMETIMES)

TRIM SWITCH	out
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	low

The input stages of many amplifiers – even some fairly expensive ones – are inherently noisy. But when a muted FLASH is plugged in to an amp then that input is shorted out, making the amp much quieter. Quieter, in fact, then it would be if it was turned on and nothing was plugged into it.

We first noticed this when demonstrating FLASH at a tradeshow sponsored by Gand Music and Sound, in Chicago. At the other booths there was this steady ambient hum; but at our booth, silence. Until FLASH's mute went off and our people played, anyway . . .

CD STUTTERING

TRIM SWITCH	in or out
SWITCHING MODE	either
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	low

In the lab we call this the "in-flight movie" effect, after the visual disorientation that sets in when you are seated in the back of a big plane and can see all the different (out-of-sync) movie screens at the same time.

Route the outputs of four CD players into the jacks of GROUP A, and connect GROUP B to your playback or recording system. Then put four copies of the same CD into the players and start them not *quite* together. Switch or layer at your leisure. And have fun (we did).

MIDI-CONTROLLED MUSIQUE CONCRÈTE (AKA THE AUDIO CUISINART)

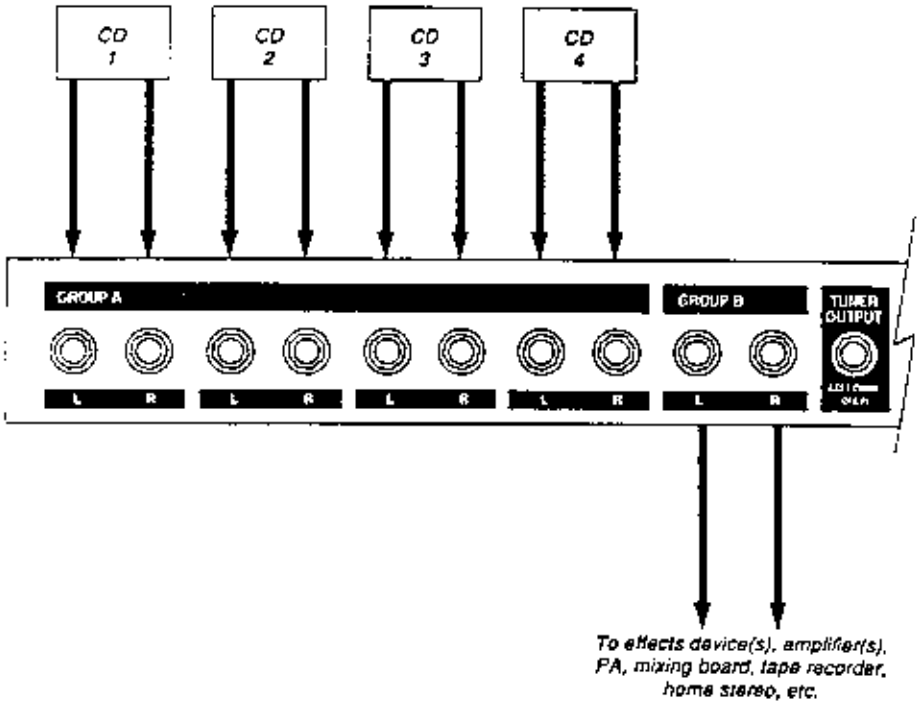
TRIM SWITCH	in
SWITCHING MODE	either
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

Here's a more serious version of the previous application.

Remember the wonderful swirly organ/calliope/circus sounds in "For the Benefit of Mr. Kite," from *SGT. PEPPER'S*? George Martin got that effect by chopping up lots of tape and splicing it back together at random. FLASH can do the same sort of thing, either by hand or over MIDI (especially over MIDI).

If you think scratching and sampling are wild, you should try this. The idea is to take diverse sources and use them to create original musical material through switching and layering tricks. Our own favorite audio collage to date has come from scrambling together CDs of Gregorian chants, Jeff Beck, Glen Miller, and Tracy Chapman.

An amazing variety of textures are possible, all under command of MIDI program changes and controller data. By varying the commands you send and their tempo you can "sculpt" the resulting sound, emphasizing one over another in various combinations. The trims can also be used as a sculpting tool.



AUTOMATED FEEDBACK CONTROL (THREE VERSIONS)

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	latch
CONTROL	MIDI
NOISE RISK	low

Here's one from Adrian Belew and the David Bowie Sound + Vision tour. To get feedback, Adrian's rig includes a Mesa Boogie amp that drives a floor-mounted speaker. Turning the amp on and off, however, would be noisy and inefficient. Instead they leave it on all the time, and use a FLASH to gate the signals going to it. One of the niftier things this makes possible is that Adrian can drive feedback in his electric guitar using his *synth* guitar output instead.

Going a little further, you could push in the trim switch and use FLASH's trims to set separate volumes for the signal going to the amp, thereby establishing up to 16 automatable feedback levels.

In addition, the two buses in FLASH could be used separately, in order to control feedback levels in different amps, or to allow two players to pull off this trick at the same time.

FIXES FOR GUITAR SYNTH AND DISTORTION LIMITATIONS

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

Two quickies.

(1) Everybody knows that MIDI guitars glitch. But using FLASH to layer a MIDI guitar and a normal guitar together can make up for a multitude of small sins.

(2) Likewise, layering fuzz guitar and clean guitar together provides all of the meanness with no loss of clarity and bite.

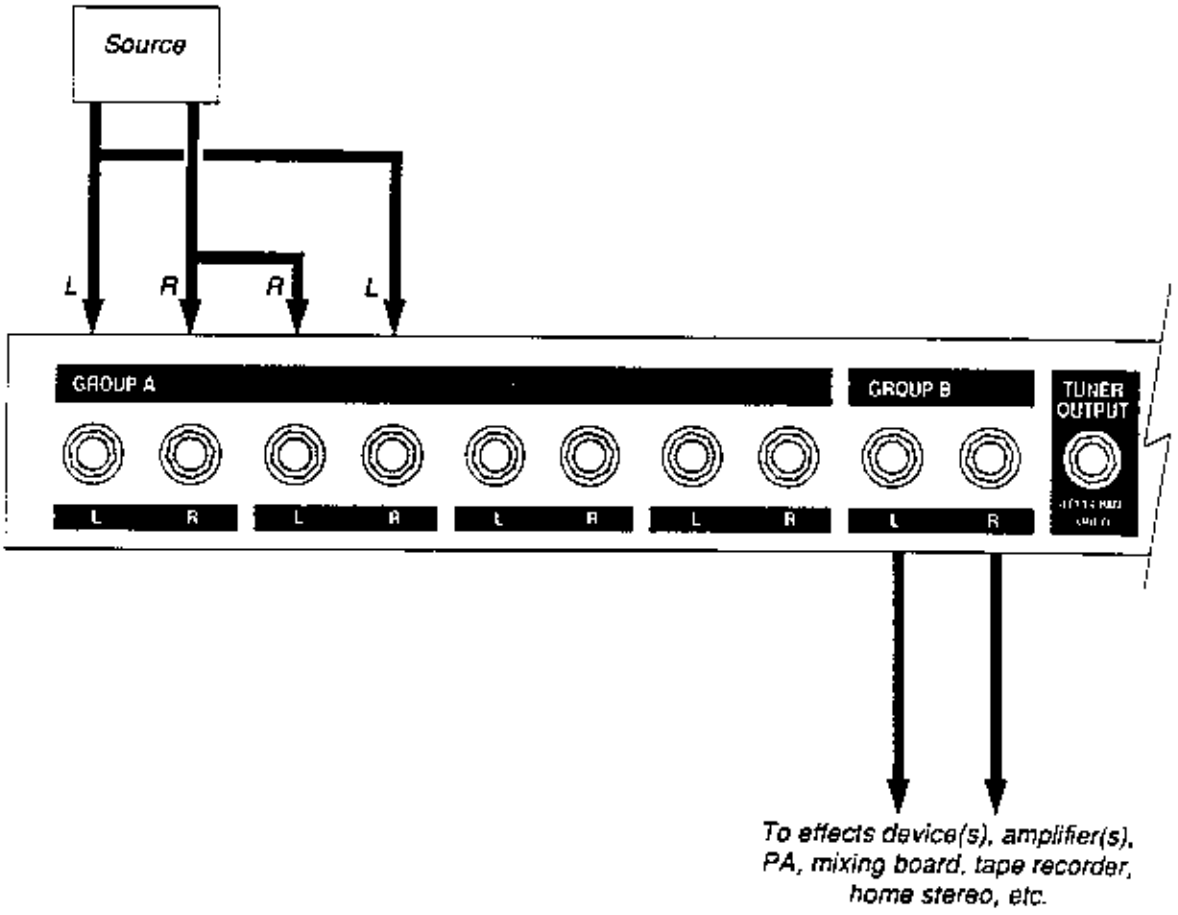
STEREO IMAGE SWAPS (AND COMBINING TO MONO)

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

There's no law requiring you to bring signals back in the same side they went out. Try this: split a stereo signal – the drum submix, say – then run one of the splits into GROUP A 1 and the other into GROUP A 2, but with left and right reversed.

- When you select 1 you've got the normal drum kit.
- When you select 2 the drums do a 180-degree flip in space.
- And when you layer 1 and 2 together they sum to mono and fill up the center.

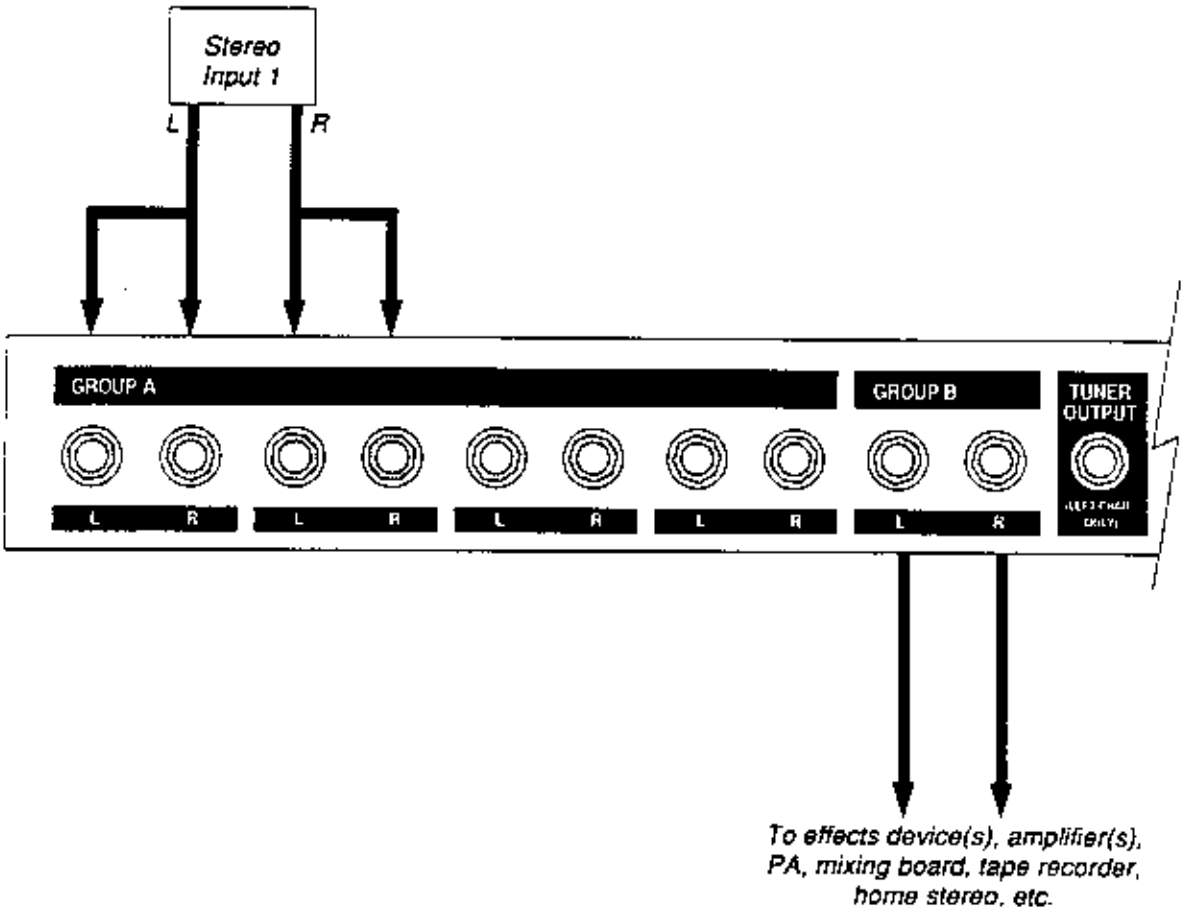
Combine this trick and variations together with adroit reverb work and we guarantee you will snap the earphone crowd to attention.



STEREO STEREO

TRIM SWITCH	in
SWITCHING MODE	either
MUTE MODE	either
CONTROL	MIDI
NOISE RISK	low

This one is left as an experiment for the user. Take one stereo source and split it into two or more identical stereo sets. Then plug them into FLASH, pairing lefts together with lefts and rights with rights. Then hit the creative trail and tell us what you figure out. (Hint: you might also want to try this the other way around, using FLASH as the splitter and sending these monoclonal pairs off to several channels of a mixing board.)


Stereo Input 1
L
R
GROUP A
GROUP B
TUNER OUTPUT
L R L R L R L R L R
To effects device(s), amplifier(s), PA, mixing board, tape recorder, home stereo, etc.

AMPLITUDE "SHIMMER"

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	MIDI
NOISE RISK	low

When the trim switch is in and you MIDI-switch rapidly between identical sources, you get a slight "shimmer" caused by subtle variations in the volume of the alternating signals.

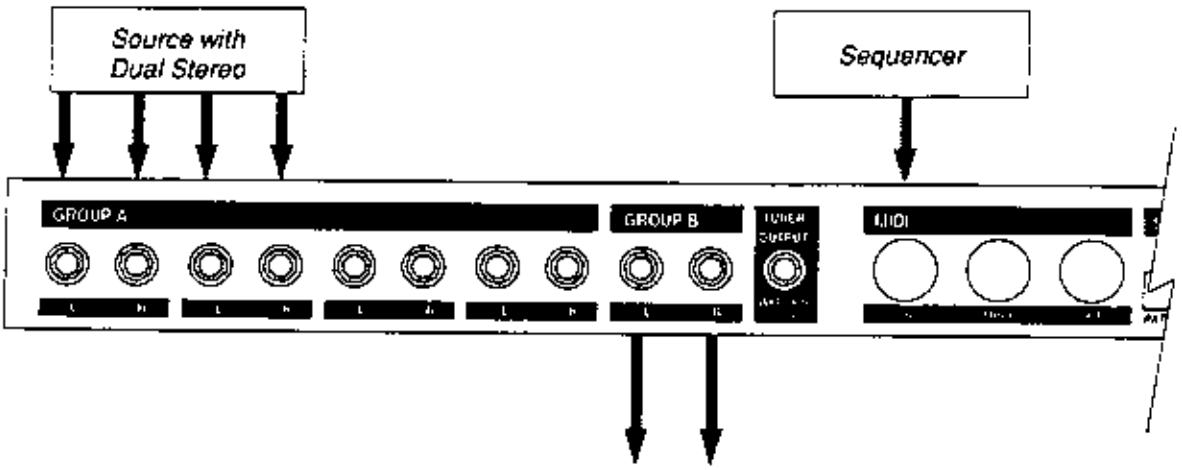
This rippling lends itself to a number of tricks. First, you can get as much or little ripple as you want by adjusting the switching speed and the relative level of the trims. Second, you can create pulsed patterns by selecting more of one level than another. Third, these shimmers can be spatial as well, if you select left/right pairs from differently-numbered jacks. Fourth, you could tweaks shimmers in real-time by moving the trims by hand. Fifth, you could set up different shimmers on two or more FLASHs and then shift between them using another FLASH, or fade between them using a standard mixboard. Six, you could use wide volume variations and set up patterns of "gates" (in which there was almost no sound) against other "gates" in stacked FLASHes. Setting these to shift at different rates of speed could create some very complex and interesting audio textures.

AMPLITUDE "SHIMMER" WITH UNCHANGING CENTER

TRIM SWITCH	in
SWITCHING MODE	either
MUTE MODE	either
CONTROL	MIDI
NOISE RISK	low

We discovered this one at Milwaukee's Kraft Keyboards, when we ran the dual stereo outputs of a Yamaha SY77 into FLASH and MIDI-switched between them at outrageous speeds.

What we observed was this: any instruments or sounds that were part of *both* outputs did not change, but instruments or sounds that were more in one than the other were subject to two kinds of "shimmer"—one the same kind described just above, from amplitude differences in the sources, and the other the actual up/down ramp of FLASH's crossfade time. The closer to



To effects device(s), amplifier(s), PA, mixing board, tape recorder, home stereo, etc.

the center these sounds were, the more stable they were. The further to the left or right, the more they shimmered. It sounded really cool and appeared to be rich ground for further experimentation.

PATCHBAY AUTOMATION AND MUTING

TRIM SWITCH	out
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	low

This is a short note, but it hints at a hundred new applications. Just remember this: a FLASH that is completely connected to a patchbay becomes a MIDI automation and muting system for that part of the patchbay. And multiple FLASHs, used together, could be used to do things like vary the order of signal routing.

Someday we'll write a book about this one.

THE AUDIO RAZOR BLADE (NOISY INSTRUMENT VERSION)

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	latch
CONTROL	MIDI
NOISE RISK	low

One of the samplers in our studio is—let's be nice—not as quiet as we might like. By a long shot. But that noise is only annoying before and after it plays a sample, not during. So we use a sequencer to make FLASH act like an audio gate. FLASH mutes the sampler output until the sampler is triggered, at which point it opens up, lets the sample through, and then mutes again. This is something like muting a channel on a board to prevent hum, but back one step in the audio chain.

THE AUDIO RAZOR BLADE (PCM AUDIO VERSION)

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	latch
CONTROL	MIDI
NOISE RISK	low

Before there were DAT machines there were PCM audio encoders, and a lot of us still use them for two-track digital mixdown. But they could never be used to assemble a decent master tape because going in and out of record mode created audible glitches.

FLASH provides an elegant fix. When working with PCM-encoded tapes in our studio we now stripe one of the longitudinal audio tracks with SMPTE. This drives a sequencer, which mutes and unmutes the FLASH that we have placed between the encoder's output and our dubbing decks. By picking when to mute and unmute we let the music through beautifully and shut the glitches out forever.

THE AUDIO RAZOR BLADE (ANALOG TAPE VERSION)

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	latch
CONTROL	MIDI
NOISE RISK	low

This is an important application for any studio working with a sequencer that is synced to tape. What the heck, let's go further—this trick is so useful it should be standard operating procedure at every studio in the world, no matter how big or small. Bold words? Read on.

Herewith, two horror stories that we all know too well. Number One: rocking the reels to find the *exact* end of a song so we can punch-in and spot-erase all the accumulated studio noise without damaging the tail of the music. Number Two (and even scarier): rocking the reels to find the exact beginning of a song so we can (urrgh) cut it with a razor and leader it in order to get rid of count-ins, open microphone noise, conversation, false starts, and so on. We don't know anyone, ourselves included, who hasn't screwed up and nicked the music with the blade more than once.

But why bother? As in the previous application, just put timecode on the tape and let the tape itself tell a sequencer when to mute and unmute the FLASH that is routing audio from the mixing board to the mixdown deck. FLASH's mute is a lot quieter than any spot-erase, a hell of a lot safer than any razor blade, and when sequencer-driven is also programmable, repeatable, and far more precise than any human hand can manage.

DAT EDITING

TRIM SWITCH	in or out
SWITCHING MODE	either
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

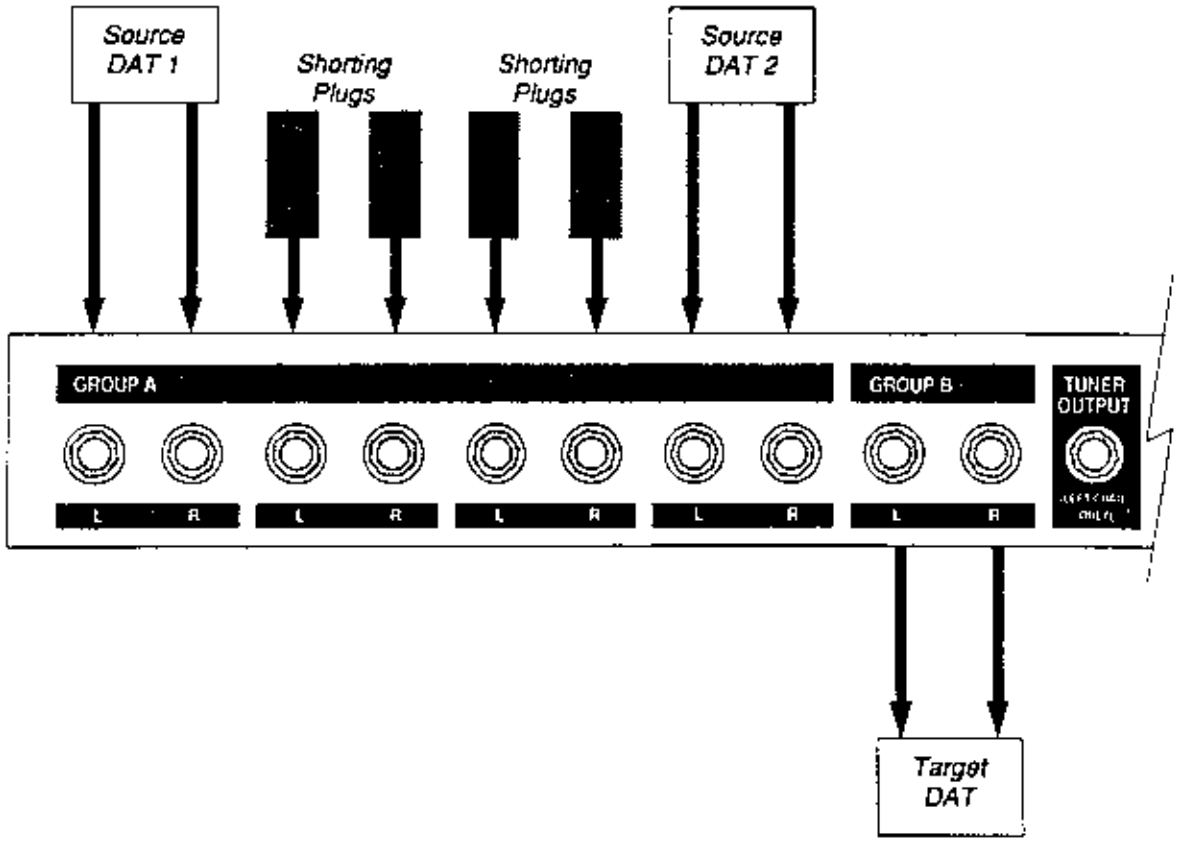
FLASH also turns out to be the poor folk's DAT editor. It's even capable of putting together butt cuts and crossfades. Why buy $15,000 worth of computer, hard disks, converters, and editing software when you can achieve the same results by borrowing or renting some gear and investing a small amount of effort? (This is admittedly not digital-to-digital editing; but with good DAT machines it would be extremely difficult to A/B the results and detect a difference.)

For dirt-simple editing: plug the analog outputs of a DAT machine into FLASH's GROUP A 1, put shorting plugs in GROUP A 2-4, and connect the GROUP B jacks to the analog input of a second DAT machine. Set your output and record levels and play from one machine into the other, hitting RECORD PAUSE on the receiving machine after each piece has played. Take it off when you are cued up and ready to play the next piece. (RECORD PAUSE is a feature on most DAT machines that automatically cues a set period of silence between tracks.)

For control over the gap (and to do butt edits) you will need three DAT machines: plug the analog outputs of two of them into FLASH's GROUP A 1 and GROUP A 4, put shorting plugs in GROUP A 2 and 3, and connect the GROUP B jacks to the analog input of the third DAT. Carefully prepare the tracks to be assembled beforehand. Put each on a separate DAT tape and line them up, odd-numbered tracks ready for one DAT player and even-numbered tracks ready for the other. The challenge here will be to play DJ—cuing up a track while that machine's input to FLASH is off, then selecting that input and starting playback at just the right time, while the third DAT machine keeps on recording.

You can even do crossfades with this setup: use the trims to bring the new signal up while you turn the other one down and then deselect it. (This is why we recommend using GROUP A 1 and 4, by the way. Crossfading is easier using the trim knobs that are farthest apart.)

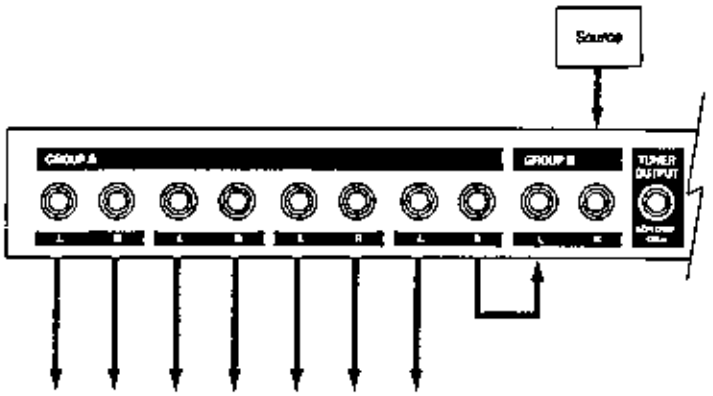
Using MIDI to do unusual left/right channel combinations would appear to be an interesting field for further exploration.



1 X 7 SPLITTER

TRIM SWITCH	out
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	HIGH

This is a potentially noisy application if you intend to do any switching. On the other hand, if all you want is a seven-way mult that is always on, it will do just fine. Our one tip: make sure your signal source is a strong one.



VIDEO SWITCHING

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

At this point we don't seriously suggest you use FLASH as a video switcher—certainly not in any professional applications. But we have tried it out and FLASH actually will handle limited video switching. It works best with black and white video; color video loses chroma and gets dark.

Some of this chroma loss can be compensated by boosting the input level of the video signal by 6 to 10dB. If the tricks you play with the signal screw up video sync and burst, you can restore them by running the damaged video into a frame store.

THE DEATH OF PUNCH-INS

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	low

With FLASH, there are fewer and fewer reasonable excuses for doing punch-ins. Do you have a limited number of tracks, so you can't separate your verse, bridge, and chorus guitar sounds? Don't bother. Run all the sounds at the same time and pick between them using FLASH. Need to replace a word or a flubbed note? Don't risk screwing up: do it on a bounce, not a punch, with FLASH sliding the new material and the old together while the original version lies untouched and unharmed.

Actually, we admit that punch-ins are likely here to stay. But with FLASH it becomes possible to avoid a lot of them. Even better, it becomes possible to solve problems in places that too tight to fix with punches anyway.

"PUNCH-INS" WHILE BOUNCING OR FLYING-IN

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	low

Here's another absolutely new technique. We have no idea how it will ultimately be used by the engineers of the world, or if it will be used at all. We just know it looks damned intriguing.

Everybody past Recording 101 knows about bouncing, fly-in, and punching. Up until now, however, these were separate techniques. They could not be combined. FLASH changes that. A FLASH inserted between source and destination lets you "punch-in" while bouncing or flying tracks.

What might be done with this? Here are some starter ideas:

- Record your "punch-in" on a clean track all by itself. When you know you have it absolutely right, bounce it and your original track through FLASH to yet another track, using FLASH to sneak the "punch" in and out on the fly. If you get it wrong, no big deal: both originals are still there to use in another try.
- Fly in tracks from several different sources at once.
- Blend brief overdubs into place by layering them through FLASH instead of just switching them.

MIXER STACKING

TRIM SWITCH	In or out
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	manual
NOISE RISK	low

FLASH can be used to combine any inputs, outputs, sends, or bypasses from one mixer with those of another. More flexibility never hurts.

THE SPACEY DRUM THING (MUTE GAMES TO THE MAX)

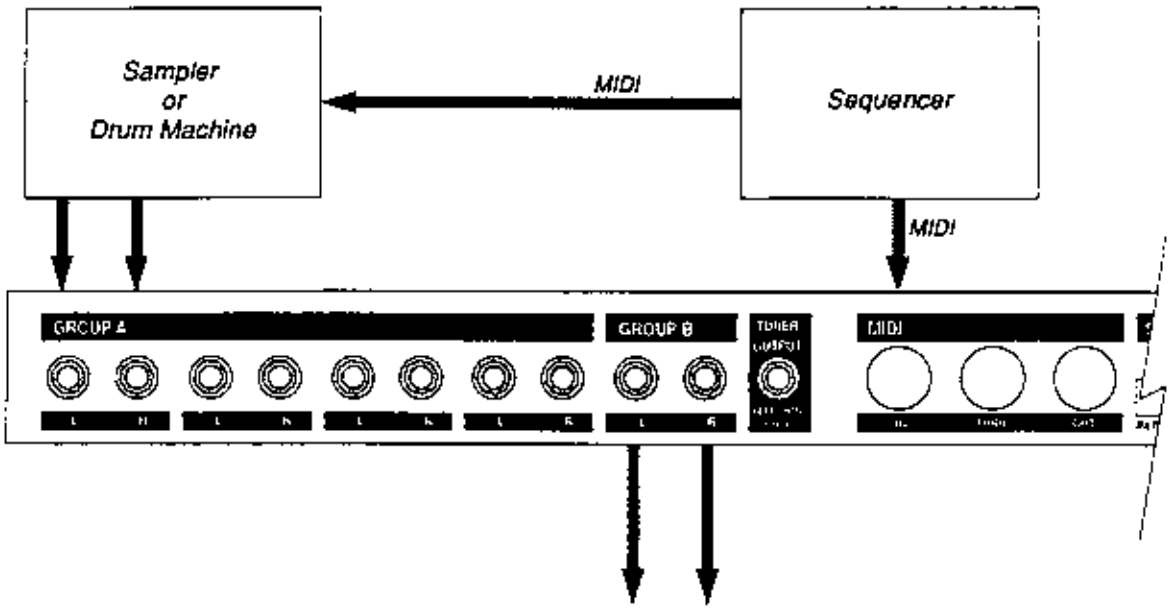
TRIM SWITCH	out
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	MIDI
NOISE RISK	low

At Marc Mann's studio in Los Angeles we set up a simple demonstration that we really enjoyed, involving nothing more than FLASH, a Mac II running Performer, and an Akai S900 that was loaded with some great drum samples.

The sequencer was sending a great drum pattern to the S900 and an insanely fast slurry of mutes to FLASH, gating the S900 on and off. We started at a tempo of 400, and the drums were buzzing as they muted on and off too fast to individually distinguish. As Marc slowed the sequencer tempo, the mutes and drum pattern slowed together in lockstep, which was

incredibly spacey. As he played with the tempo, sliding it up and down, we couldn't help but sway with the effect.

We never got to try it that night, but later we set up two different sequencers running at two different tempos, one for FLASH and one for the drumbeat. Moving those back and forth against each other was even spacier!



To effects device(s), amplifier(s), PA, mixing board, tape recorder, home stereo, etc.

MASTER CHANNEL REPLACEMENT & SUBMIX BUS MUTING

TRIM SWITCH	in or out
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	manual
NOISE RISK	low

Just about every good-sized mixing board has four submix buses and, of course, a stereo master channel. But not every board's master channel sounds as good as what you can hear on the buses, due to audio degradation caused by additional active electronics.

Here's a fix: bypass the master output! Route the four submix buses directly to FLASH, and FLASH directly to your mixdown deck. Presto, instant improvement in audio quality! The tradeoff is that you lose the use of your master stereo faders. On the other hand, you gain the ability to programmably switch, layer, and mute your submix buses.

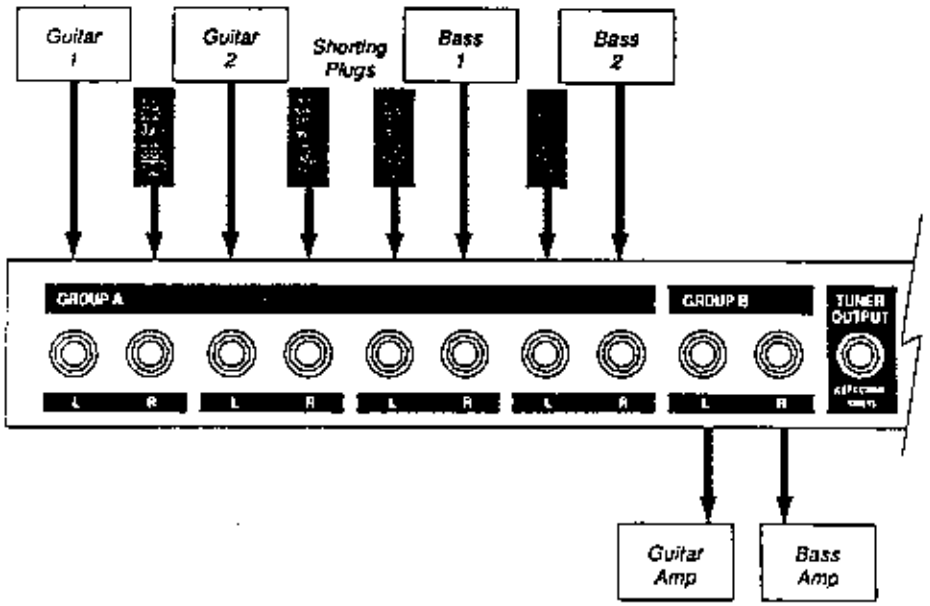
SHARING TWO AMPS AND FOUR INSTRUMENTS

TRIM SWITCH	out
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	manual
NOISE RISK	low

A garage band problem solved. One of our local groups, not having the cash to own (let alone cart) all the equipment that they might desire, is forced to share gear in the course of a show. Basses and guitars are constantly being swapped around, and there is only one amp per class of instrument.

The setup shown in the diagram below takes care of things quite neatly, and will also work for any player using two different instruments with two different amps.

All you have to do is plug the two guitars into GROUP A LEFT 1 and 2; the two basses into RIGHT 3 and 4, and shorting plugs into everything else in GROUP A. The guitar amp plugs into GROUP B LEFT and the bass amp into GROUP B RIGHT. Using latch mode, any guitar and/or bass combination can be called up—best of all, the instruments are always routed to the right place and the unused amp is automatically muted.

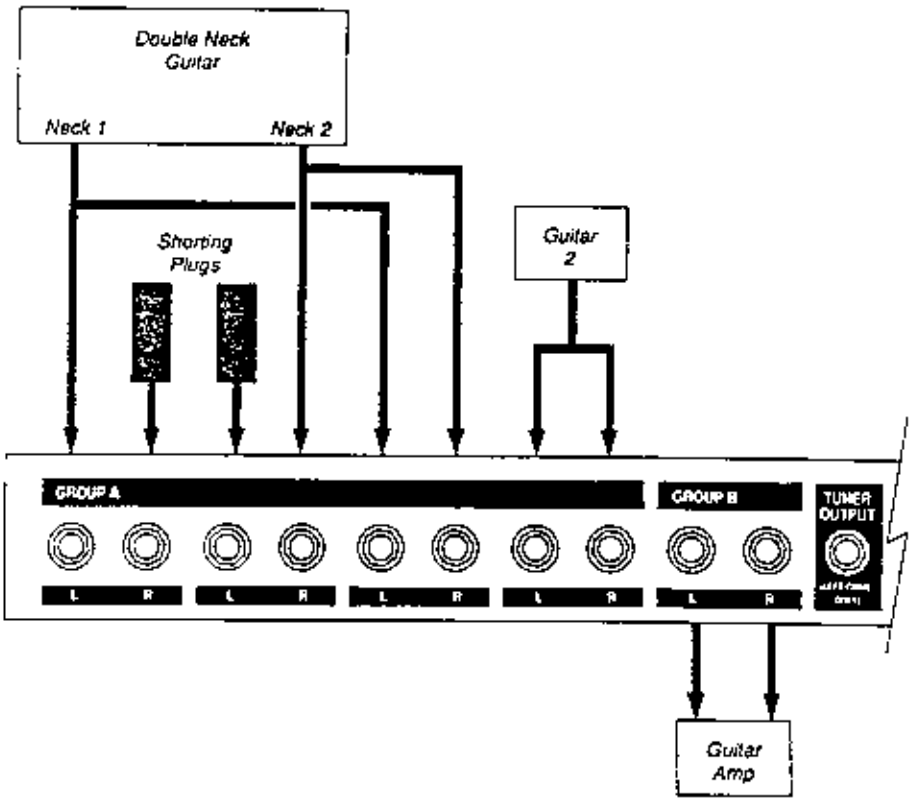


MORE GUITAR SELECTION GAMES (FOR FOLKS WITH DOUBLE-NECKS)

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	low

Having finessed the headache behind the previous application, it occurred to us that a single player using both a regular guitar and a double-neck would find FLASH handy as well. The first neck of the double-neck would go into GROUP A LEFT 1 and 3, the second neck would go into RIGHT 2 and 3, the regular guitar would go into both sides of 4, and LEFT 2 and RIGHT 1 would get shorting plugs. In this setup the foot pedal can be used to switch either or both necks of the double-neck, and select the regular guitar as well.

The setup would be muted while switching guitars, of course.



PRODUCT DEMOS AND TESTING

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	latch
CONTROL	manual
NOISE RISK	low

Because FLASH itself is so quiet and switches silently, it is a killer demo/comparison/test tool for audio gear. We learned this at one trade show where our booth was taken over temporarily and FLASH used to run A/B comparisons on the entire line of Lexicon reverbs. (What won? We're not telling.)

Since then we have used FLASH to make purchasing decisions on several different pieces of gear. Switching instantly and noiselessly from one sound to another, right in the middle of a note, reveals a heck of a lot about the merits and demerits of competing boxes.

Beyond self-defense for consumers, we see some very practical applications, ranging in-store comparative product demonstrations to directly comparing similar synth patches (in order to pick exactly the right sound for an orchestration). We have used the latter trick effectively to check attacks against attacks, middles against middles, and trailing fades against fades.

SUBTLE EFFECTS

TRIM SWITCH	in or out
SWITCHING MODE	either
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

Some of the things we've mentioned in this section could not be accused of subtlety. FLASH can be incredibly subtle, though, since what it does depends on how you connect it and to what. In switching and layering reverbs, for example, you could use FLASH to bring in delicate touches of backplane reflection. Or you could use it to turn on and off distant microphones, to create subtle rotational effects, or to switch and layer digital delays with differences of only milliseconds (chorused DDLs, anybody?). So. It's fine to be hot with FLASH. But it's also fine to be cool.

LANGUAGE DECONSTRUCTION

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

More wild stuff for the maniacs in the assembled audience. Imagine having seven tracks with seven vocalists all singing the same part, or doing weird scatty vocals, and using FLASH to cross-stitch them together into one single take on a bounce. How about turning separate male and female voices into a single, seamless blend? Or assembling people saying different things into yet another statement?

MIDI REMAPPING GAMES

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	MIDI
NOISE RISK	low

This requires either a sequencer or an excellent MIDI mapping device. But imagine, for a moment, that you had a drone going from one source and used the note ons and offs of a percussion part as *mute* controls, gating the drone's audio based on what was happening in the percussion track. It could be an either/or thing, muting when a drum was hit or opening up; your choice.

SWEEPING THROUGH THE CHANGES

TRIM SWITCH	in
SWITCHING MODE	either
MUTE MODE	latch
CONTROL	MIDI
NOISE RISK	low

Simple thought. First, program a MIDI footpedal or fader to sweep through all the program changes in either the low or high MIDI response range. Then hook up four inputs to a FLASH in that range, connect the MIDI pedal or fader, and lean on it to sweep through 64 different signal routings in a single pass. To get really crazy, hook up two at the same time and move them in opposite directions.

LAYERING LOOPS

TRIM SWITCH	out on first FLASH & in on 2nd
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	low

Way back at the beginning of this section we said that multiple effect loops could only be switched, not layered. With one FLASH that's true. But with two it can be done. You would simply use the first FLASH to split the source signal out to the effects in question, and the second FLASH to gather them all back in. The first FLASH would control the second over MIDI: hook the MIDI Out of the first FLASH to the MIDI In of the second, and do all selectng from the first FLASH.

CONTROLLABLE ELECTRONIC COMPONENT NETWORKS AND SUBSTITUTIONS

TRIM SWITCH	out
SWITCHING MODE	latch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	none

Put 100K ohm resistors into every jack in GROUP A and you have a MIDI-programmable variable resistance network connected to whatever was plugged into GROUP B. Picking any one GROUP A jack would give you 100K ohms of resistance. Picking two together would place these resistors in parallel, giving you the equivalent of a 50K ohm resistor. Three jacks would be 33K ohms, four jacks 25K ohms, 5 jacks 20K ohms . . . you get the idea. (If you try this, keep in mind that FLASH adds roughly 200 ohms in series to any jack that is active.)

But why stop with resistors? Why not hook in capacitors, or diodes, or switches and logic gates? Serious wireheads and techies (or guys who hire serious wireheads and techies), listen up! With variations on this trick you could: (1) Change capacitors in tone control circuits in order to change frequency or bandwidth; (2) Change resistors in tone control circuits in order to change frequency, bandwidth, or resonance; (3) Change diode types in fuzztones in order to alter distortion (i.e., switch from silicon to germanium, which we did to a Muff fuzz with great results); (4) Automate tone shift controls in amplifiers; (5) Alter circuit configurations on the fly by switching connections within the circuit; (6) Automate any switches (such as bypass, pad, frequency, assigns, and so on) that handle signal level or logic level; (7) Automate delay range or mode switches on DDLs and multi-effects; and (8) Lots of other weird (but cool!) things.

MONO AUDIO MIXES FOR TV

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	manual
NOISE RISK	low

These days many television programs are broadcast in stereo, but not all. And though you'd expect otherwise, even expensive mixboards sometimes don't have summing monos. FLASH can provide exactly that for engineers needing to produce high-quality mono mixes for television. All that's necessary is to split both sides of the final stereo mix, plug one set into GROUP A 1 and the other, reversed, into GROUP A 2, then select both sets together.

SWITCHING AND MUTING COMBINED

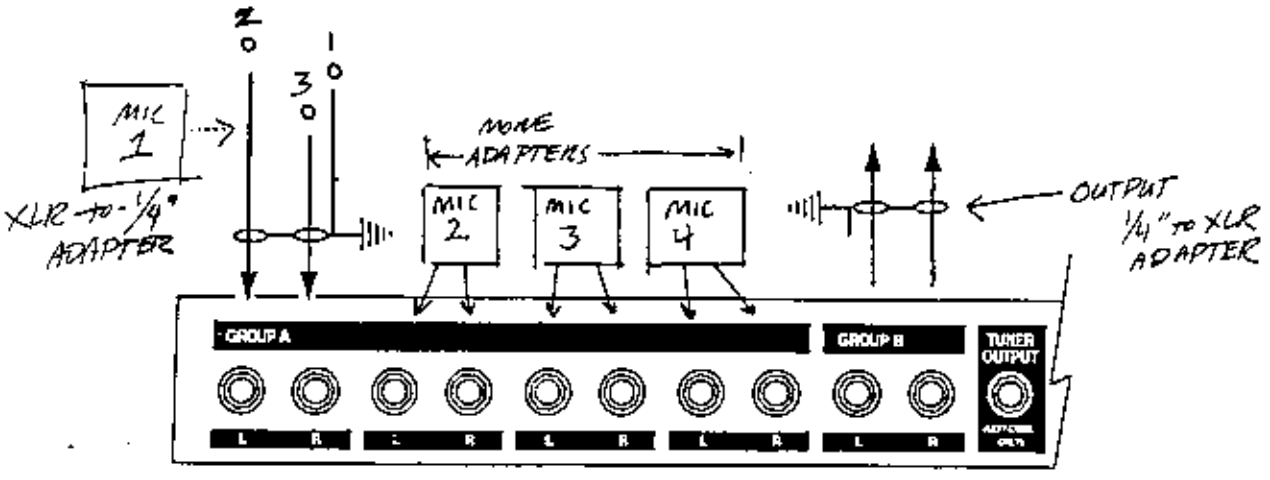
TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	MIDI
NOISE RISK	low

Try this—every time you unmute, come up in a different switching configuration. You could use this to make flipped stereo images more obvious (thanks to the slight gap that would exist between them) or to create pulsed sound or stereo position effects: left left left *right* left left left *right* . . .

MICROPHONE SELECTION

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	low

With the adroit use of some XLR-to-1/4" adapters (see diagram below), FLASH becomes a 1-of-4 microphone selection box. This trick was first crafted for a sax player who played both soprano and bari, needed a separate microphone for each, and wanted a convenient way to make sure that only one microphone would be live at any time. This same microphone selection/automation idea could be expanded and applied to all kinds of miking situations—drumkits, stage vocals, signal isolation in the studio, etc.



DRIVING AND OVERDRIVING AMPS

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	low

A guitarist looking to drive amps more flexibly should look at this combination: running their guitar signal into a high-quality gain box, and running that box's output into FLASH. With this setup FLASH's trims can be used to adjust the levels going to one or more amps, allowing selective overdriving.

Doing things this way dramatically cuts noise compared to going guitar level throughout.

STITCHING NOTES TOGETHER

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	latch
CONTROL	MIDI
NOISE RISK	low

The Korg M1 and Roland D-series synthesizers create some of their most realistic and interesting effects by stitching the attack transient of one sound onto the continuing waveform if another. On a slightly grosser scale, FLASH will let you do the same thing for yourself.

DDL GATING

TRIM SWITCH	out
SWITCHING MODE	punch
MUTE MODE	either
CONTROL	manual or MIDI
NOISE RISK	low

When you listen to a mix and hear a single word echoed at the end of a phrase, you know exactly what happened – there was somebody at the board snapping a send to the DDL open and shut by hand. This works, but demands precise timing. FLASH allows this process to be considerably simplified. But the mute in MOMENTARY mode, split the signal to be echoed so that it is going both to mixdown and to the DDL *through* FLASH, and then just let go of the mute long enough for that word to get through. Letting go of a mute is much easier and more precise than punching in a send. With MIDI, of course, the whole thing can be automated.

All of the above assumes you only want to play the game with one source. FLASH, of course, will let you pull in more than one source at a time, and send them in more than one direction.

THE CLEANEST POSSIBLE FINAL MIX (FOR A WHILE, ANYWAY)

TRIM SWITCH	in
SWITCHING MODE	latch
MUTE MODE	latch
CONTROL	manual or MIDI
NOISE RISK	low

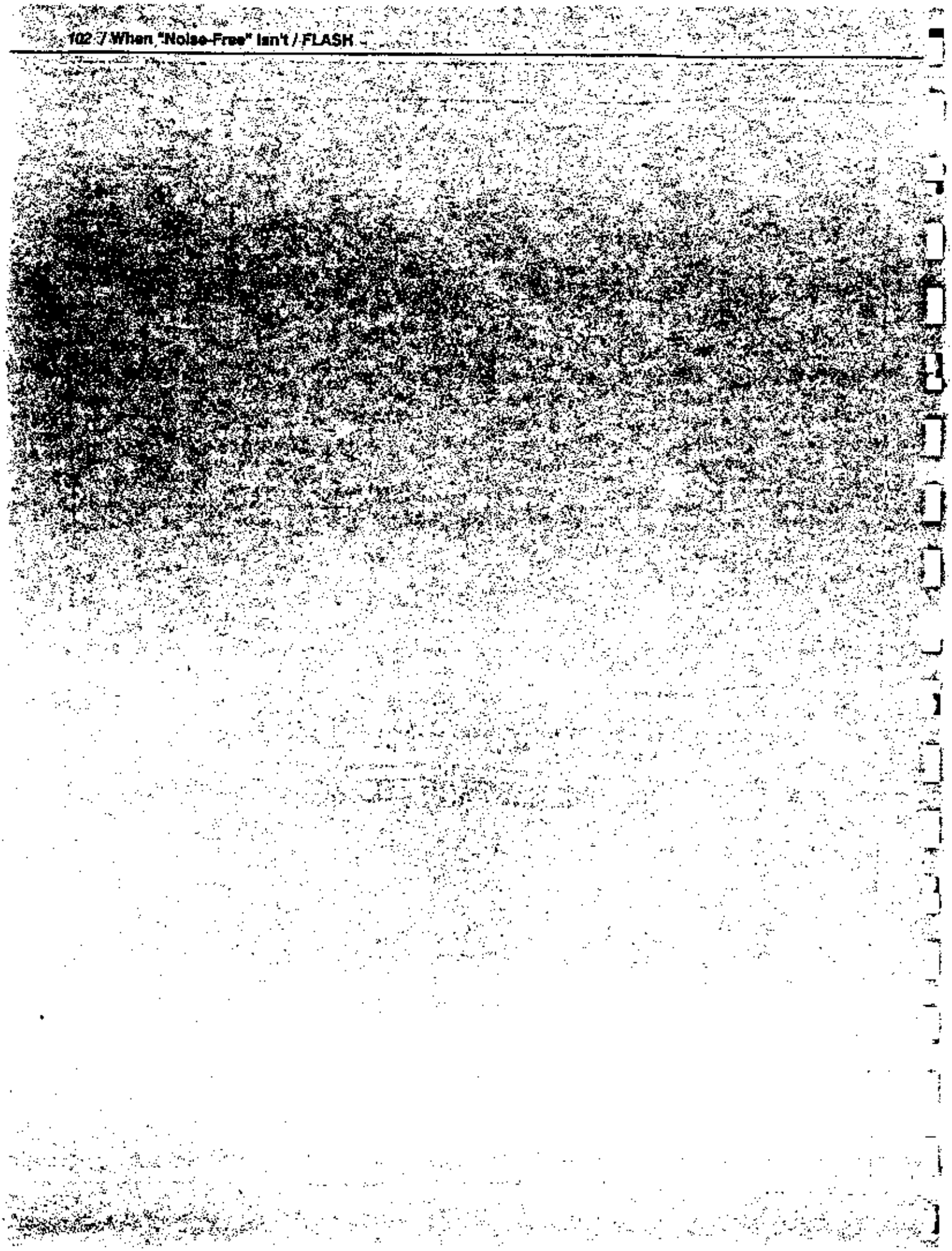
Take one FLASH (or more than one if you need more inputs). Wire them together as needed to bring all your inputs down to a single stereo send. Go easy on the trims; use them as necessary, but don't overuse them. That done, start recording, straight from source to digital master with your signal passing through FLASH and only FLASH. (Make sure you either *don't* mute any of the FLASHs, or else that you mute them all at the same time; muting just one will short out the rest.)

As long as you don't need EQ, there's nothing to beat this approach. Go ahead – try it for yourself. Or ask for our free FLASH demo tape, which was recorded in exactly this fashion.

7

When "Noise-Free" Isn't:

PROBLEMS AND FIXES



Our thanks to Michael Stewart for his contributions to this section. Michael's ACM (Audio Control Module) is a nifty eight-channel audio fader box, which, like FLASH, is based on passive electronics under MIDI control. We recommend that FLASH customers who are looking for automated signal level check it out. It's available from Michael's company Niche and is distributed by Steinberg-Jones, 1700 Raymer Street, Suite 1001, Northridge, CA 91325).

Noise is the enemy. In the audio world (especially the digital audio world) we go to considerable lengths to get rid of it. Yet there are times, damn it, when noise comes creeping into our gear despite our best efforts.

FLASH is designed to be as noise-free as any piece of audio equipment ever created (and a lot more than most). Its tested specs, available in the **Technical Appendices**, speak for themselves. But good as FLASH is, it is not absolutely immune to all possible sources of noise. In fact, because of the nature of FLASH's design, it may actually *reveal* problems and noise in systems that seemed fine before.

In this section we'll take a look at these headaches and what you can do to cure them.

Geared up? Good. Let's talk ground hum, DC offset, MIDI radiation (MIDI radiation?!), low frequency thump, computer whine, dirty connections, component mismatches, the perils of open wire, and other such unpleasant stage and studio houseguests.

GROUND HUM

Grounding is one of the great mysteries. It's an art as much as a science, some have said, and there's considerable truth to the statement. Getting it right is tough, and we all know the price for getting it wrong: ground hum.

If there is significant ground hum in your system, pressing in FLASH's trim switch can make it louder.

THE CAUSE. With the trim switch in, FLASH has about a 4.7K output impedance. In most situations – certainly in properly-grounded ones – that's enough to effectively "short" the link between FLASH and other gear and prevent ground hum. In an improperly-grounded system that isn't guaranteed; and since FLASH connects gear in new ways, it may reveal ground hum in a system that never hummed before. (The potential for hum was there all the time. All FLASH did was make it effectively louder.) The test for this is to push FLASH's trim switch **in**. This raises FLASH's output impedance and makes for less of a "short;" if the hum you hear gets louder with the trim switch in, you have a ground problem.

THE FIX. There's nothing for it but to get your grounding act in order. Some of the things you can try include lifting ground at one end of the audio cable that is connected to FLASH; lifting AC ground for either FLASH or the other units in question; making sure that FLASH and everything electrically attached to it are tied to the same ground; installing central point

grounding for the entire system (or building); buying a Juice Goose for your power line. . . whatever works, works. And if you don't know what you are doing, crack some books or call in expert help. Grounding can be tricky business.

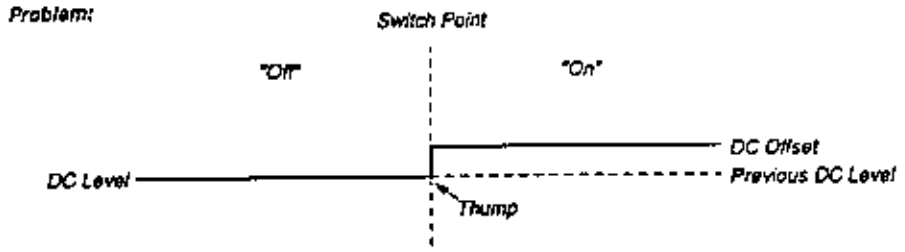
THE BIG FIX. Of course, for serious ground problems there's nothing for it but to start from scratch. Disconnect everything. We repeat: *everything*. Then connect things together again, one piece at a time, starting with the amplifier and working your backward through the audio chain. At any stage in which you detect ground hum you should stop, analyze the cause, and ruthlessly root it out.

THE REAR-PANEL GROUND LIFT CONTROL (DIP switch #12). FLASH's ground should generally be lifted. One of the only times you will want FLASH set to chassis ground is when FLASH is the reference groundpoint for the entire system, such as when it is connected to some low-level source like a guitar or a microphone. The right setting is whichever is quietest.

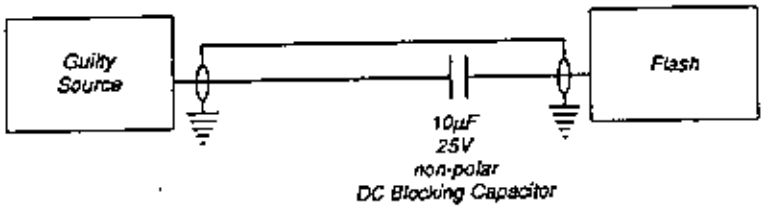
DC OFFSET

This one annoyed the hell out of us during beta test. There we were, switching noise-free as you please in setup after setup, when suddenly we started getting these tiny *pops*. It only happened with some gear, not everything, and so it took a while to track down. In the end it turned out to be another problem that FLASH revealed but wasn't responsible for.

THE CAUSE. All signal outputs have a DC level. And all well-designed equipment (in our opinion) references that level to a flat 0 volts. Some designers apparently don't consider this to be important, and the DC output from their gear can be offset from 0 by varying amounts. Normally this poses no problem. But when FLASH switches between gear with differing DC levels, as shown in the diagram below, the voltage change at the input to the receiving amplifier causes an annoying pop. In other words, the switching is noise-free—but the amp freaks out down the line when it gets the result!



THE FIX. Simple. All you have to do is insert a DC-blocking capacitor in series with the output of the offending device, as shown in this schematic:



You can make up your own DC-blocking cable, get a local tech to make one for you, or contact us for a custom job. *Cost will vary according to connector, cable choice, and required length.*

FOR THE RECORD. The chief offenders in this matter of DC offset were our Kurzweil K1000 modules. Pending further tests, we recommend that if you use any Kurzweil product with FLASH you connect it with a DC-blocking cable.

MIDI RADIATION

This is really RF (radio frequency) noise we're talking here, but RF specifically tied to MIDI cables. You'll hear it as a whine or buzz, and it may be intermittent. It will tend to be louder in some things connected to FLASH than in others, which can help you track down the specific source.

THE CAUSE. As MIDI data travels down a cable, RF is generated. In a well-made, well-shielded cable, this is no problem. But not all cables are well-made or well-shielded. So when an RF-leaking MIDI cable runs too near a signal-carrying cable, the RF can induce noise. Please note that this noise doesn't have to be in a cable directly attached to FLASH in order to be audible: if it was happening between a synth and a mixer, and the mixer's output went to FLASH, you would still hear the MIDI-induced noise.

THE FIX. (1) Get the best cables you can buy, always. (2) Separate your MIDI cables as much as possible from signal-carrying cables. If (1) and (2) fail, then (3) install additional shielding.

LOW FREQUENCY THUMP

Here's a rare one: an actual intermittent sniglet of noise made by FLASH when switching high-volume, very-low-frequency signals.

THE CAUSE. Assume a sound with a roughly 30Hz (or lower) fundamental—i.e., a 32 foot-pedal C. The half-cycle time of this sound is around 16 milliseconds. FLASH's crossfade time is around 2.5 milliseconds, so if we switch that 30Hz signal at exactly the peak of its cycle we will briefly introduce Fourier components into the signal, at roughly 200Hz, creating a "thump" that is 6-18db down from original signal, depending on that signal's timbre. On terrific playback equipment this might be audible. (Keep in mind that this is an extreme example. You have to catch the exact peak of the cycle for it to happen, and any signal over 100Hz—which is most program material—won't thump at all, because of the interaction of crossfade and half-cycle times.)

THE FIX. The nature of the problem makes it unlikely to occur (or recur). Should it do so, however, a good parametric equalizer and some exploratory low-frequency notching ought to clear things up.

COMPUTER WHINE

This is similar to MIDI radiation, above (though less intermittent), and with a similar fix: do your best to shield your signal-carrying cables from the RF that your computer is broadcasting.

BIG-TIME RF

People living near power lines, microwave towers, major highways, and TV or radio broadcast antennas may experience even worse RF problems with FLASH than they already do with their other gear. After all, what FLASH does is connect things together, creating an even bigger receiving "antenna."

The ultimate fix for this problem is to build your studio inside a Faraday cage, like Wendy Carlos did. For those who can't go to such extremes, we recommend consulting a RF shielding expert. Preferably one who is local—he or she should be familiar with the problems specific to your environment.

DIRTY CONNECTIONS

When you listen to something that sounds bad all on its own, after a time you begin to tune out the noise and forget that it is there. But when you switch to that unit from something that sounds super-clean, it's bad news.

THE CAUSE. Accumulated dirt in jacks and on connectors, brought about by time, chemical reactions, and miscellaneous airborne dust, dirt, molds, pollen, and pollution (not to mention other things you don't want to know you are breathing).

THE FIX. Get cleaning! We recommend that you get a can of Cramolin R5, from Caig Labs, (619) 743-7143. It's worth its weight in gold, and a little lasts a long time.

LOUSY CABLES.

Same problem as above, different fix: get good cables and throw out the old.

COMPONENT MISMATCHES

This is similar to the dirty connection problem, but a bit sneakier. We first discovered it when switching back and forth between doubled outputs from one CD player: everything was fine when we listened to two left/right pairs of the same signal, but when we listened to left/left and right/right pairs, one side seemed significantly noisier than the other.

THE CAUSE. Poor or mismatched components in the CD player. When we put it on the scope it was obvious that one channel was significantly better in audio quality, even after we cleaned all the connectors and double-checked our cables.

THE FIX. Sending the defective gear in for service. If that doesn't work, replacement. If neither of these options is available to you, either don't use the gear or else live with the results.

EXTREMELY HIGH CLARITY

This is not so much a problem as a hazard of technologies that evolve at different rates. Digital recording and signal processing have become so quiet in recent times that all sorts of noises we never heard before are now audible. Want to know what the noise floor in our current studio is during a microphone session? It's the whisper-quiet transformer hum from the DBX noise reduction units that we use on the analog multitrack. You don't notice it during the session, but on playback from the DAT machine it is annoyingly obvious. Sheesh!

What we are saying here is that FLASH, like digital recording, is so quiet that it allows you to hear noises you may never have heard before. In these situations the only real fix is to isolate them and fix or ignore each new noise on a case-by-case basis.

THE PERILS OF OPEN WIRE

As discussed in the **Applications** section, some uses of FLASH are inherently prone to noise because they leave wires open and connecting jacks unshorted. The level and extent of such noise will depend on the quality of the gear in use, the number (and nastiness) of noise sources in the environment, and lots of other things.

The fixes are potentially as numerous as the problems themselves, and just as unpredictable. In general, however, we recommend (1) putting shorting plugs into any jacks on FLASH which are unused in an application; (2) disconnecting any cables from FLASH that don't have to be there (since open cables just increase the amount of "antenna wire" hanging out there); and (3) thinking of a cleaner way to do the job. Contact us for advice about specific situations.

FLUORESCENT LIGHTING AND LAMP DIMMERS

Surely you know this one by know. Fluorescent lights and lamp dimmers buzz, put hash in the power line, and are largely incompatible with signal-carrying gear of any kind, period. Power-conditioning and other shielding tricks can help, but if real signal purity is your goal, we suggest you stick to incandescent lights and save dimmers for the dining room.

It's a big, bad world out there, with lots of opportunities for trouble. If you run into noise problems with FLASH that are not listed in this section, contact us immediately so we can figure them out and come up with a fix! Thanks.

8

The Outro... WHO and HOW

"We get by with a little help from our friends."

Without the following people, FLASH would never have made it into the spotlight:

Jay Craggs	concept/prototyping/product specialist (live & guitar applications)
Al Jewer	electronics/software
Don Hay	design
Kenton Marti	manufacturing
Jon Blick	electronic engineering
Wayne Tobias	mechanicals
Chuck Reilly	finance
Noel Spangler	graphics
Rick Hill	engineering assistant
Andy Ellis	engineering associate
Dwayne Carter	product specialist (studio applications)
Dave Hill	west coast office
Freff	ends & odds

And SPECIAL THANKS to Dennis Adams, Jim Aikin, Adrian Belew, Aleda W. Bourassa, Randy Bugg, Jeff Burger, Sara Burr, David Channing, Nicolas Collins, Chris Conte, Jim Cripe, Rich Denhart, Brian Donnelly, Ron and Shirley Ellis, Joan and Gary Gand, Getter Press, Dick Goldberg, Ian Goldrich, Mary Gunderson, Gary Hall, Dan Hartung, Stan Hertzmann, Alan Howarth, Michael Hurwith, Arlene Hay, Alan Hay, Daniel Hill, Loa Hill, Robert Hill, Brian Hunt, Brent Hurtig, Laurie Inagaki, Linda Jacobson, Alison Jewer, Antoinette Jewer, Maxwell Arthur Jewer, Lee Jonas, Russ Jones, Marc Jorgenson, Jason Klagstad, Susie Key, John Knapp, Jamie Krutz, everybody at LaBelle Industries in Oconomowoc (site of all our manufacturing and, incidentally, the city where The Wizard of Oz premiered in 1939), Mike Lang, Mark Lange, Laughing Cat Studio, Sammy Llanas of the Bodeans, Mike Malizola, Jim Manning, Rob and Aubrey Manning, Michael Marans, Andy Marein, Karen Marti, Susan Mazer, Dominic Milano, Cathy Modrall, Bob O'Donnell, Steve Oppenheimer, Brian and Wanda Parsonnet, Vic Pataca, Bruce Pierson, Jane Purcell, Fred Rose, Royal Recorders, Debbie Sebel, J.D. Sharp, David Shaw, Jody Sheehan, Dallas Smith, Jan Spangler, Specialty Press, Michael Stewart, Steve Torres, Umbrella Management, Mark Vail, Mark Waldrep, Andy Widders-Ellis, Scott Wilkinson, Trip Witter, Bob Wurm, and absolutely everybody else we may have forgotten, without whom . . .

TECHNICAL APPENDICES

APPENDIX 1
Unit and Audio Specs

UNIT SPECIFICATIONS

FLASH

Description:	Noise-Free 4x1 Stereo Signal Switcher with Passive Mixing and MIDI
Dimensions:	(front) standard 1-high 19" rackmount (chassis) 1 5/8"h x 17"w x 9"d
Weight:	7 lbs.
Electrical:	120V 35W 50-60Hz
Input limits:	50 volts, .1 watts (100 milliwatts)
Switching:	16 possible combinations from front panel or optional silent footpedal 256 possible combinations via MIDI
Switching speed:	up to 100 times a second via MIDI
Controls:	(front) on/off switch signal selection switches 1-4 trim on/off button trim knobs 1-4 (rear) 12-selection DIP switch (sets MIDI channel, local control on/off, MIDI merge on/off, MIDI response range, switching mode default, mute mode, mute light mode, mute default on power-up, and ground choice)
Indicators:	(front) 7-segment alphanumeric LED switching readout single dot MIDI data indicator switch indicator LEDs 1-4 (green) mute indicator LED (red)
Connectors:	(front) 8-pin DIN remote control jack (rear) 1/4" Group A I/O jacks (4 L/R pairs) 1/4" Group B I/O jacks (1 L/R pair) 1/4" tuner output jack (left bus only) 5-pin DIN MIDI In, Thru, and Out jacks 8-pin DIN remote control jack power cable jack
Power:	internal transformer with plug-in IEC standard cable

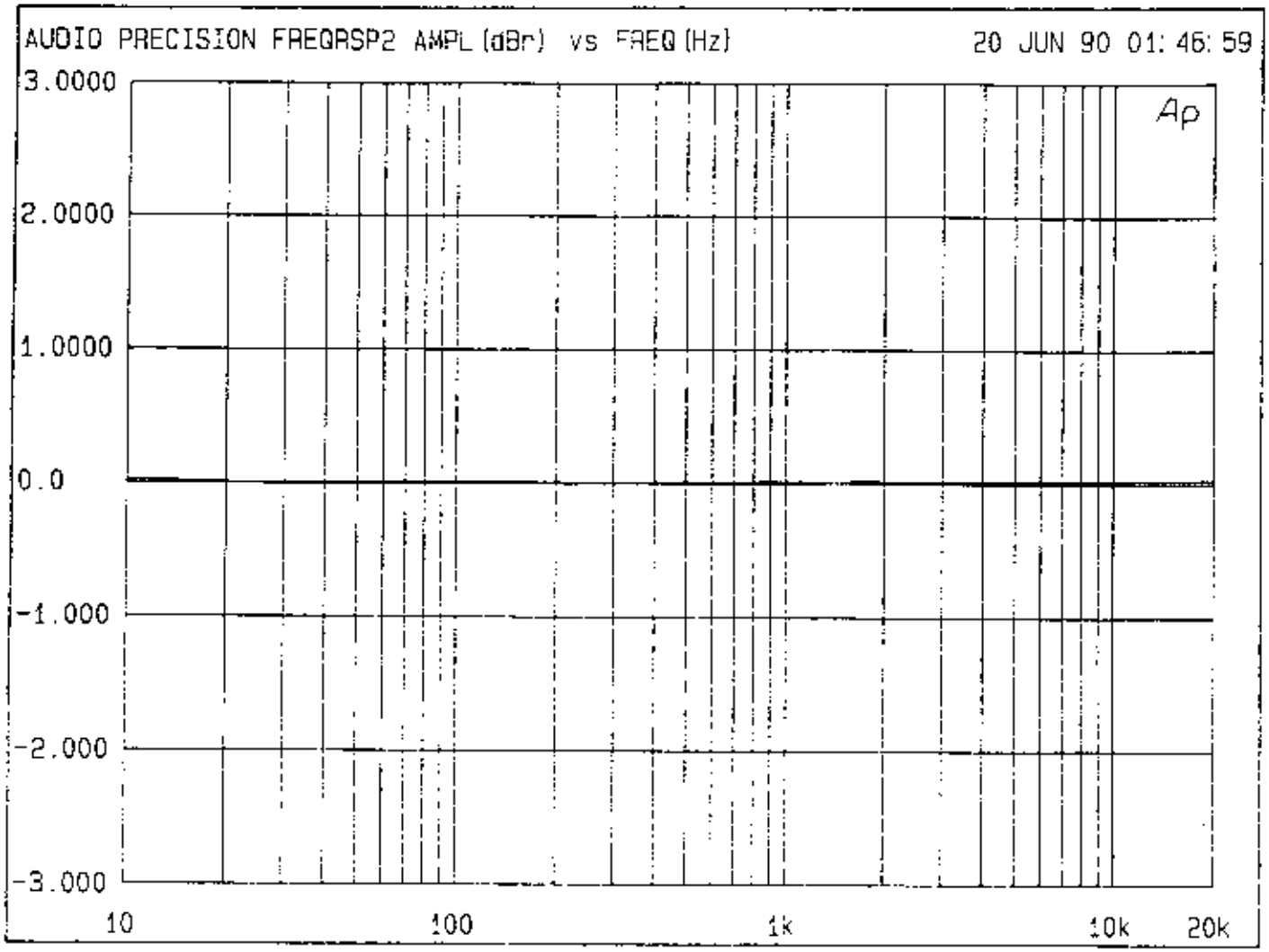
FLASH SILENT FOOTPEDAL

Dimensions:	2 1/4"h (rear) x 1"h (front) x 17"w x 6 3/8"d
Weight:	4 lbs.
Controls:	signal selection buttons 1-4 mute button switching mode selection button (punch/latch)
Indicators:	switch indicator LEDs 1-4 (green) mute indicator LED (red) switching mode indicator LEDS (yellow)
Connectors:	8-pin DIN remote control jack 8-pin DIN extension chaining jack
Chaining:	up to five footpedals chained in one line up to six footpedals connected to FLASH, total
Power:	supplied by FLASH

TESTED AUDIO SPECS

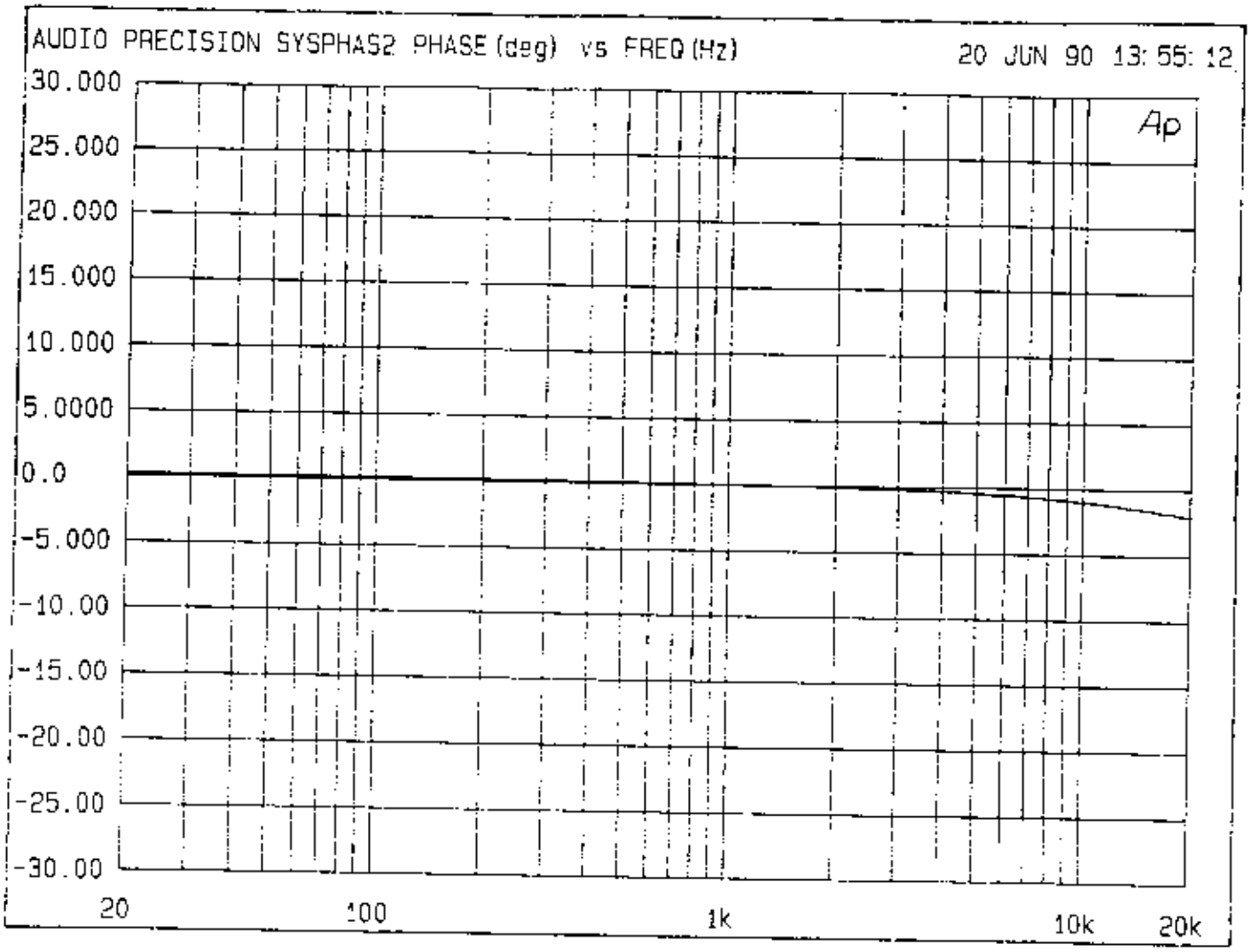
All tests were run with an Audio Precision System One and Rev 2.0 software. Only unbalanced ins and outs were used, and the cables connecting FLASH and the Audio Precision were one foot long.

Signal/Noise:	-108dB ref to 0 DBM (with shorting plug at input) -112dB ref to 0 DBM (mute engaged)
Attenuation:	-100dB @ 1 kHz (mute engaged)
Pad (trims in):	-10dB
Trim range:	-10dB to -28dB (18dB overall range)
THD:	unmeasurable (less than the residual noise of the test equipment, which was approximately .0008% from 20Hz-20kHz @ +18 DBM)
Frequency response:	±.1dB from 20Hz-20kHz @ +4 DBM
Crosstalk:	-96dB @ 1kHz (with shorting plug in one input and1kHz @ 0 DBM in other channel)
Residual noise:	unmeasurable from 20Hz-200kHz



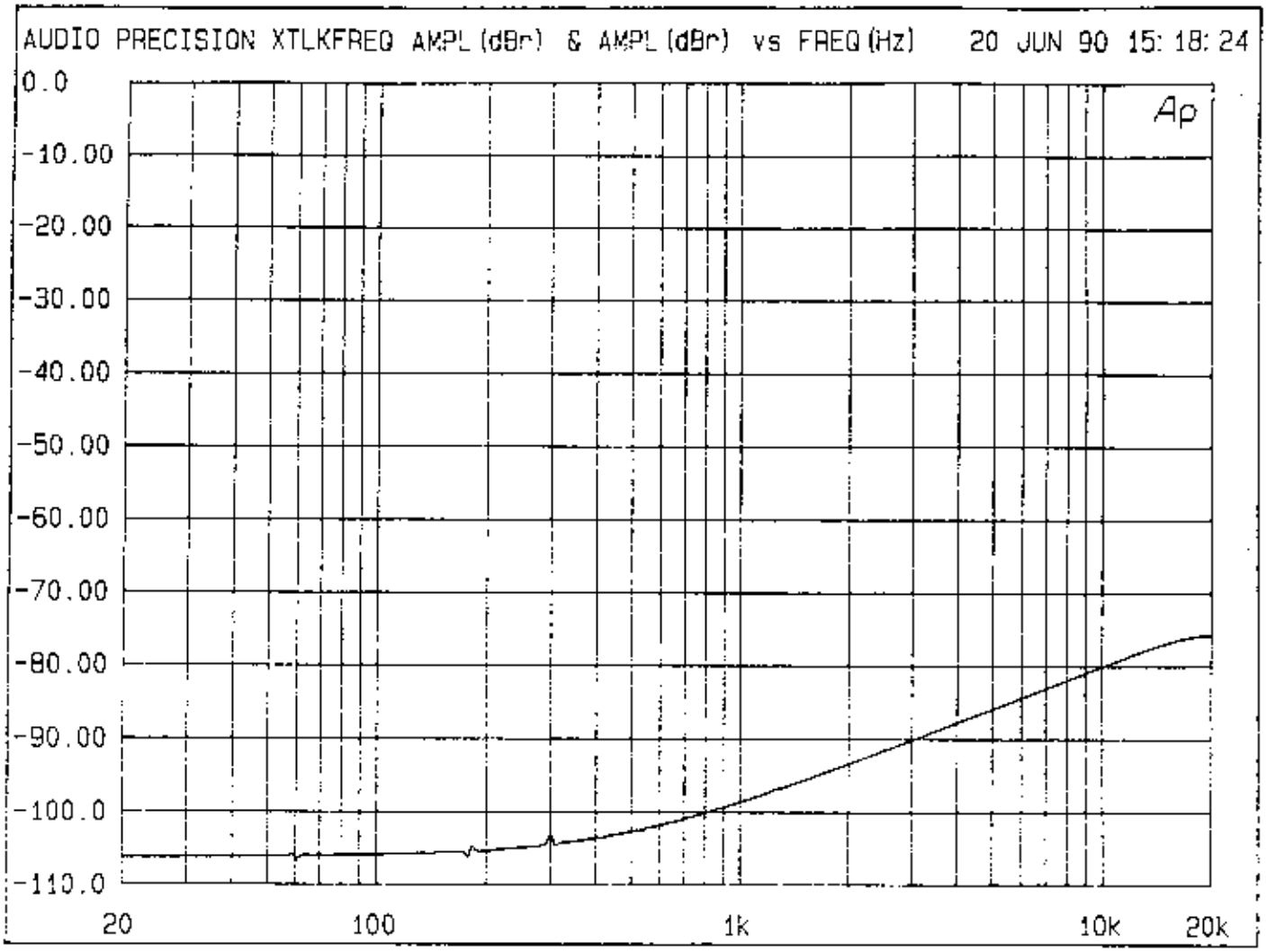
FREQUENCY RESPONSE
10Hz to 20kHz (scale: ±3dB)

The vertical scale on this plot has been greatly exaggerated in order to reveal something other than a perfectly straight line. Using a +4 DBM test signal, we estimate variation in FLASH's frequency response from 20Hz to 20kHz to be less than ±.1dB.



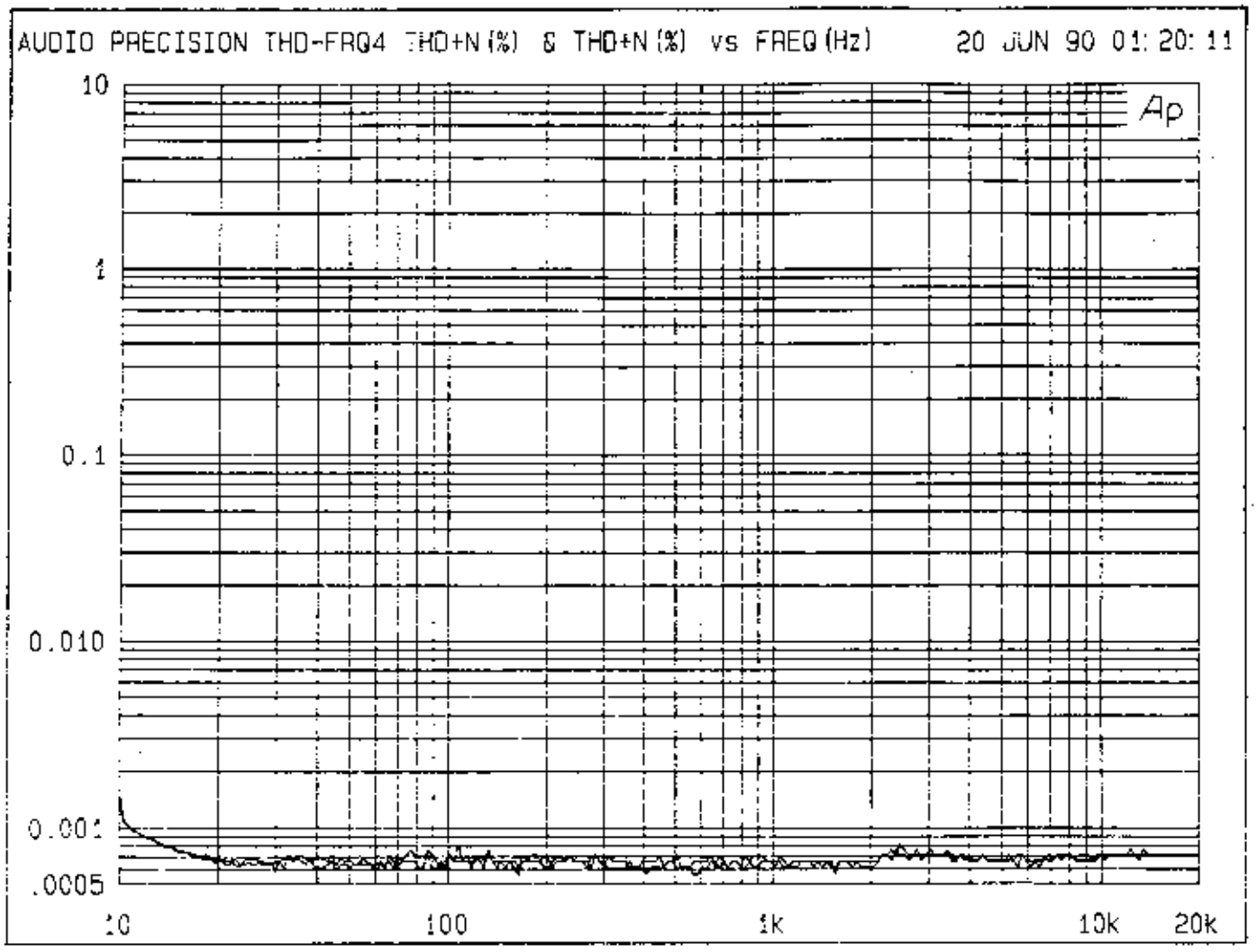
PHASE RESPONSE
20Hz to 20kHz (scale: ±30 degrees)

FLASH tests flat for phase response from 20Hz to 2kHz. It starts to lag at that point and by 20kHz, as a result of residual capacitance in the system, it shows a phase shift of approximately -1.8 degrees. To discover the real world effect of this amount of phase shift, tilt the tweeter end of your speakers backwards about 1/100th of an inch. (Conversion of this figure to metric is left as an exercise for the reader.)



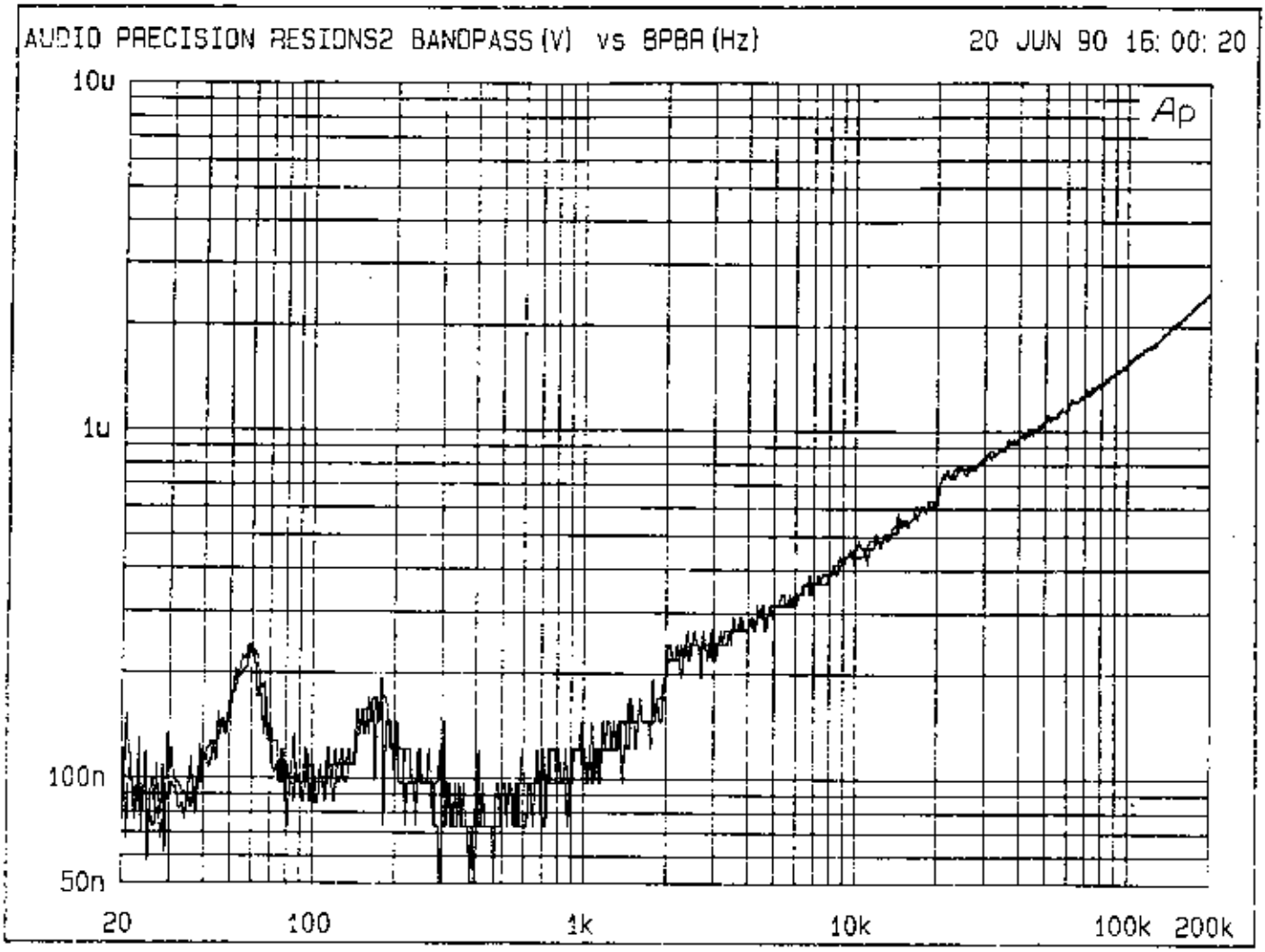
CROSSTALK, 20Hz to 20kHz (scale: -110dB to 0 DBM)

At frequencies less than 100Hz, FLASH measures -107dB of channel crosstalk. At 1kHz this climbs slightly, to -96dB, and at 20kHz it flattens out at -76dB (which is better than most mixing boards claim at 1kHz).



TOTAL HARMONIC DISTORTION
10Hz to 20kHz

This chart shows two essentially indistinquishable lines plotted on the same graph. One of the lines is FLASH and the other is residual system noise in our Audio Precision System One test gear. This result tells us that whatever FLASH's THD actually may be, it plus the residual system noise is less than .0008% distortion from 20Hz to 20kHz. That'll do.



RESIDUAL NOISE, 20Hz to 200kHz (scale: 50 to 10,000 nanovolts)

At last, a dramatic looking test plot. Dramatic until you know what it represents, anyway. The two lines ploted here show the residual noise results for a $27,000 Audio Precision System One test gear and a $500 FLASH (with mute engaged). As with the THD results in the previous chart, residual noise measurements between the two units are essentially the same. The maximum observed fluctuation is under five nanovolts, which is well within the Audio Precision System One's range of testing error.

APPENDIX 2
MIDI Implementation

IMPLEMENTATION NOTES

- FLASH responds to either of two different sets of program changes and controllers, depending on which **MIDI response range** has been selected using rear panel DIP switch #7. If DIP switch #7 is **down**, FLASH responds to the **LOW** range. If DIP switch #7 is **up**, FLASH responds to the **HIGH** range. In each range there are 64 program changes and 6 controllers. This arrangement allows two separate FLASH units to be independently controlled on a single MIDI channel.
- Controller #7, MIDI Volume, affects both ranges. It turns mute on and off (0 = mute on; any other value = mute off).
- Any of FLASH's 256 possible switching configurations can be called up using either single or paired program changes, or controller #15 (Alternate Program Change).
- The MIDI data indicator light in FLASH's alphanumeric LED readout flashes if the unit receives *any* MIDI data (with the exceptions of Active Sensing and MIDI Clock). The channel of the incoming data does not matter.
- The MIDI merge function in FLASH automatically filters Active Sensing data.
- Whenever FLASH is manually switched or muted it sends out a MIDI message identical to the one that would have switched it to that state. *It does this even when DIP switch #5, local control, is set to off.*
- The MUTE TOGGLE controller command (20 for low range, 28 for high range) works differently depending on the mute status of *both* buses. If both buses are on, then the MUTE TOGGLE controller command mutes them. If both are muted, it turns them on. If one bus is muted and the other is not, however, then MUTE TOGGLE does not flip both—instead it just unmutes both buses.

CONTROLLER FUNCTION	CONTROLLER NUMBER	
	LOW RANGE	HIGH RANGE
MUTE (0 = mute, 1-127 = unmute)	7	7
Alternate Program Change	15 (0 - 63)	15 (64 - 127)
Left Bus Mute (0 = mute, 127 = unmute)	16	24
Right Bus Mute (0 = mute, 127 = unmute)	17	25
Switching Mode Select (0 = punch, 127 = latch)	18	26
Mute Mode Select (0 = latch, 127 = momentary)	19	27
Mute Toggle (any value toggles mute state)	20	28

SWITCHING IN RESPONSE TO PROGRAM CHANGES

KEY: number (#) = on, (–) = both buses off, (°) = this bus off/no change in other bus

LEFT / RIGHT PAIRS				PROGRAM	
				LOW	HIGH
–	–	–	–	0	64
1	–	–	–	1	65
–	2	–	–	2	66
–	–	3	–	3	67
–	–	–	4	4	68
1	2	–	–	5	69
1	–	3	–	6	70
1	–	–	4	7	71
–	2	3	–	8	72
–	2	–	4	9	73
–	–	3	4	10	74
1	2	3	–	11	75
1	2	–	4	12	76
1	–	3	4	13	77
–	2	3	4	14	78
1	2	3	4	15	79

RIGHT BUS ONLY (HAS NO EFFECT ON LEFT BUS ON / OFF)				PROGRAM	
				LOW	HIGH
°	°	°	°	32	96
1R	°	°	°	33	97
°	2R	°	°	34	98
°	°	3R	°	35	99
°	°	°	4R	36	100
1R	2R	°	°	37	101
1R	°	3R	°	38	102
1R	°	°	4R	39	103
°	2R	3R	°	40	104
°	2R	°	4R	41	105
°	°	3R	4R	42	106
1R	2R	3R	°	43	107
1R	2R	°	4R	44	108
1R	°	3R	4R	45	109
°	2R	3R	4R	46	110
1R	2R	3R	4R	47	111

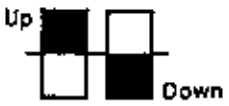
LEFT BUS ONLY (HAS NO EFFECT ON RIGHT BUS ON / OFF)				PROGRAM	
				LOW	HIGH
°	°	°	°	16	80
1L	°	°	°	17	81
°	2L	°	°	18	82
°	°	3L	°	19	83
°	°	°	4L	20	84
1L	2L	°	°	21	85
1L	°	3L	°	22	86
1L	°	°	4L	23	87
°	2L	3L	°	24	88
°	2L	°	4L	25	89
°	°	3L	4L	26	90
1L	2L	3L	°	27	91
1L	2L	°	4L	28	92
1L	°	3L	4L	29	93
°	2L	3L	4L	30	94
1L	2L	3L	4L	31	95

INDIVIDUAL JACKS (ON / OFF)				PROGRAM	
				LOW	HIGH
1L on	°	°	°	48	112
°	2L on	°	°	49	113
°	°	3L on	°	50	114
°	°	°	4L on	51	115
1L off	°	°	°	52	116
°	2L off	°	°	53	117
°	°	3L off	°	54	118
°	°	°	4L off	55	119
1R on	°	°	°	56	120
°	2R on	°	°	57	121
°	°	3R on	°	58	122
°	°	°	4R on	59	123
1R off	°	°	°	60	124
°	2R off	°	°	61	125
°	°	3R off	°	62	126
°	°	°	4R off	63	127

APPENDIX 3
Factory Defaults

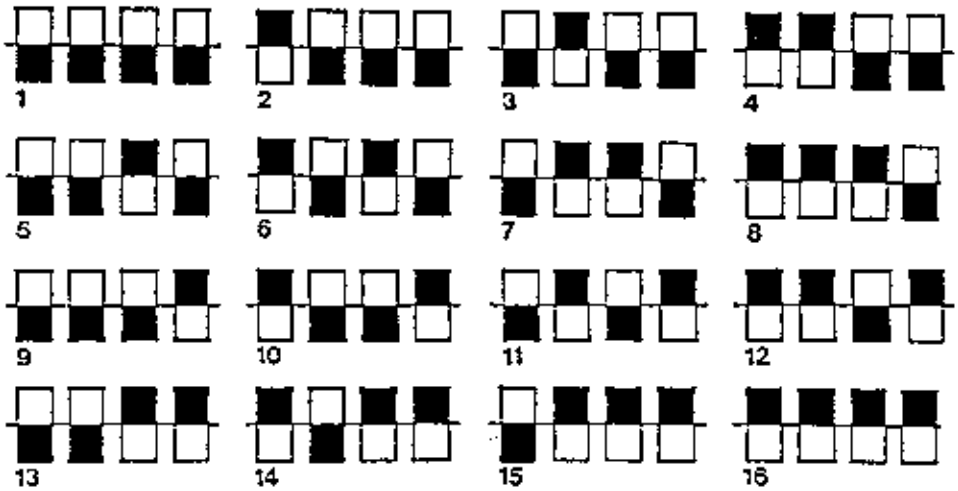
REAR PANEL DIP SWITCH SETTINGS

SWITCH	FUNCTION	DEFAULT
#1-4	MIDI Channel selection (1-16)	**16**
#5	MIDI Local Control (on/off)	**on**
#6	MIDI Merge (on/off)	**off**
#7	MIDI Response Range (low/high)	**low**
#8	Switching Mode Default (punch/latch)	**punch**
#9	Mute Mode (latch/momentary)	**latch**
#10	Mute Light (steady/blinking)	**steady**
#11	Mute Default on Power-Up (mute off/mute on)	**on**
#12	Ground Choice (ground lift/chassis ground)	**lift**

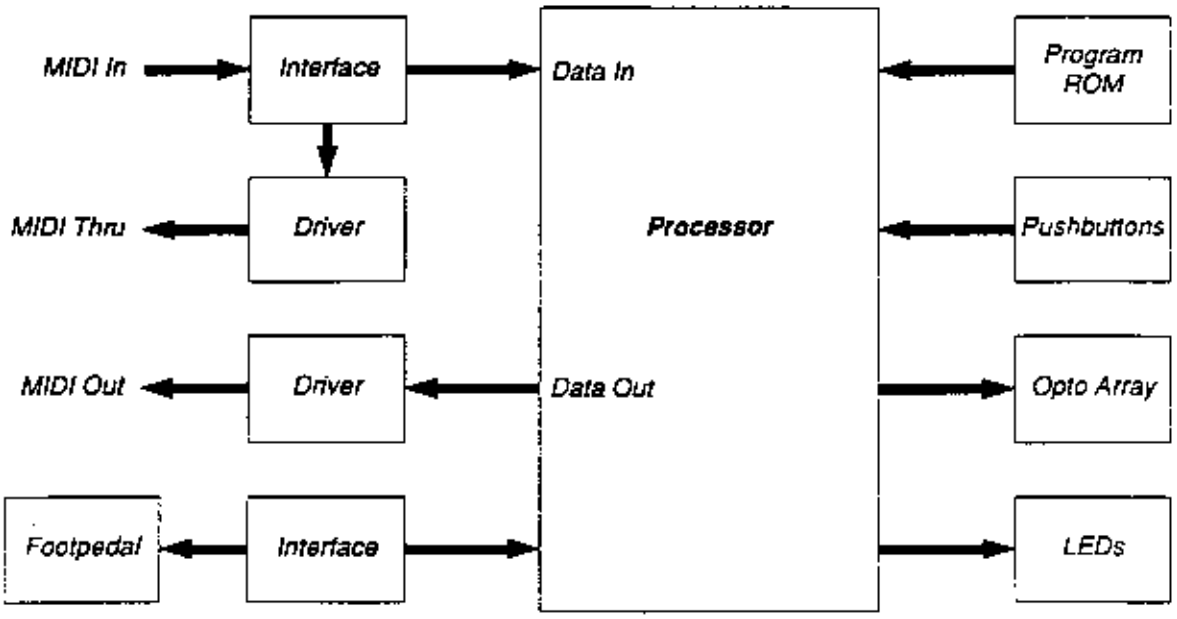


Factory Defaults

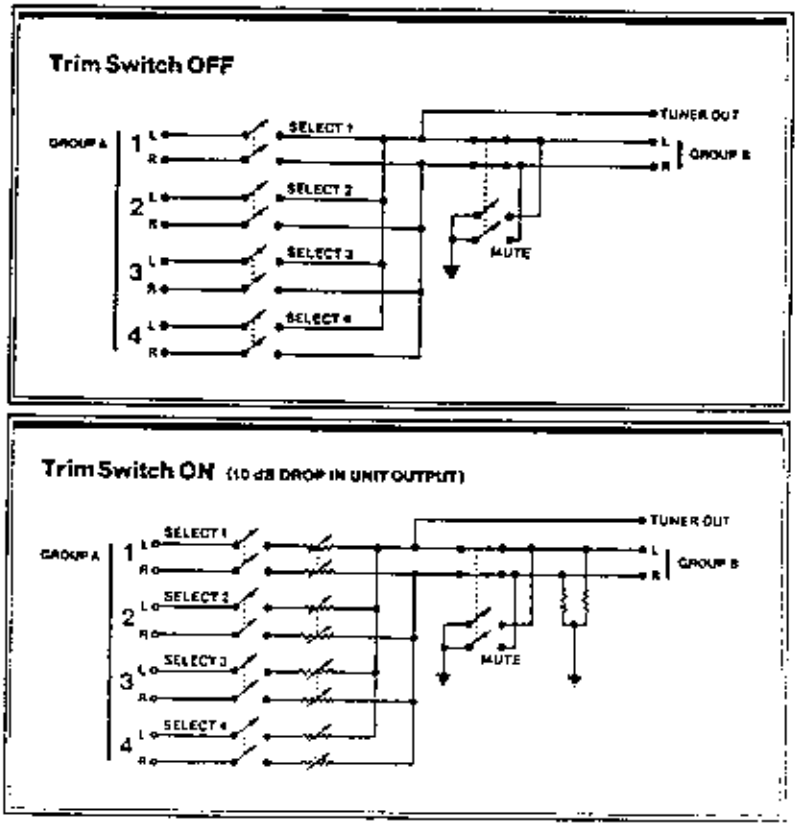
MIDI CHANNEL



APPENDIX 4
Block Diagram



APPENDIX 5
Description of Circuitry
by Al Jewer, Uptown VP Engineering



The Flash circuitry consists of three parts: (1) The audio switching and blending circuitry, (2) The computer control circuitry, and (3) The footpedal remote control circuitry.

The audio switching circuitry consists of 12 opto switches configured as shown in the diagram at the beginning of this appendix.

Each opto is driven separately by the microprocessor, allowing any combination of optos to be turned on and off under microprocessor control. A switch is used to change the circuit configuration between either switching or blending. When the switch is disengaged, the only components in the signal path are opto switches. When the switch is engaged, it connects a 10K resistor and a 100K potentiometer in series with each group A input jack. It also connects a 4.7K load resistor from the output bus to ground; this provides a load for the blending function and lowers output impedance.

The computer circuitry is controlled by an Intel 8032/8052 microprocessor, which contains on-board RAM and serial port (for MIDI). The processor reads its instructions from a 27128 type EPROM memory chip. MIDI In information is received by the PC-900 opto-isolator and converted to the proper form to be sent to the microprocessor serial input for processing. The same signal is buffered and sent to the MIDI Thru jack. The serial output pin of the microprocessor is buffered and sent to the MIDI Out jack.

The option setting switches are read by the microprocessor using a 74LS244 latch chip (SW 1-8) as well as direct port connection (SW 9-11). This data is used to control the operation of the software.

Group A selections and MIDI activity are indicated by a 7-segment display located on the front panel. The microprocessor drives this display using a 74LS374 latch. LEDs and pushbuttons are driven and read using a serial shift register approach. The same circuitry is used internally to sense the switches and drive the LEDs as is used in the footpedal controller, which results in all switches and LEDs being driven at the same time, both on the front panel and at the foot controller. To drive the LEDs, data is presented on the SDATA line one bit at a time, and is clocked out to the LEDs in serial fashion using the LEDCLK line. To sense keypresses, a scan bit (0) is presented to the SDATA line and clocked through all eight possible switch positions using KBDCLK. Keypad data is returned over the KDATA line, and sensed by the microprocessor. 74LS164 shift registers are used for both LED drive and keyboard scanning.

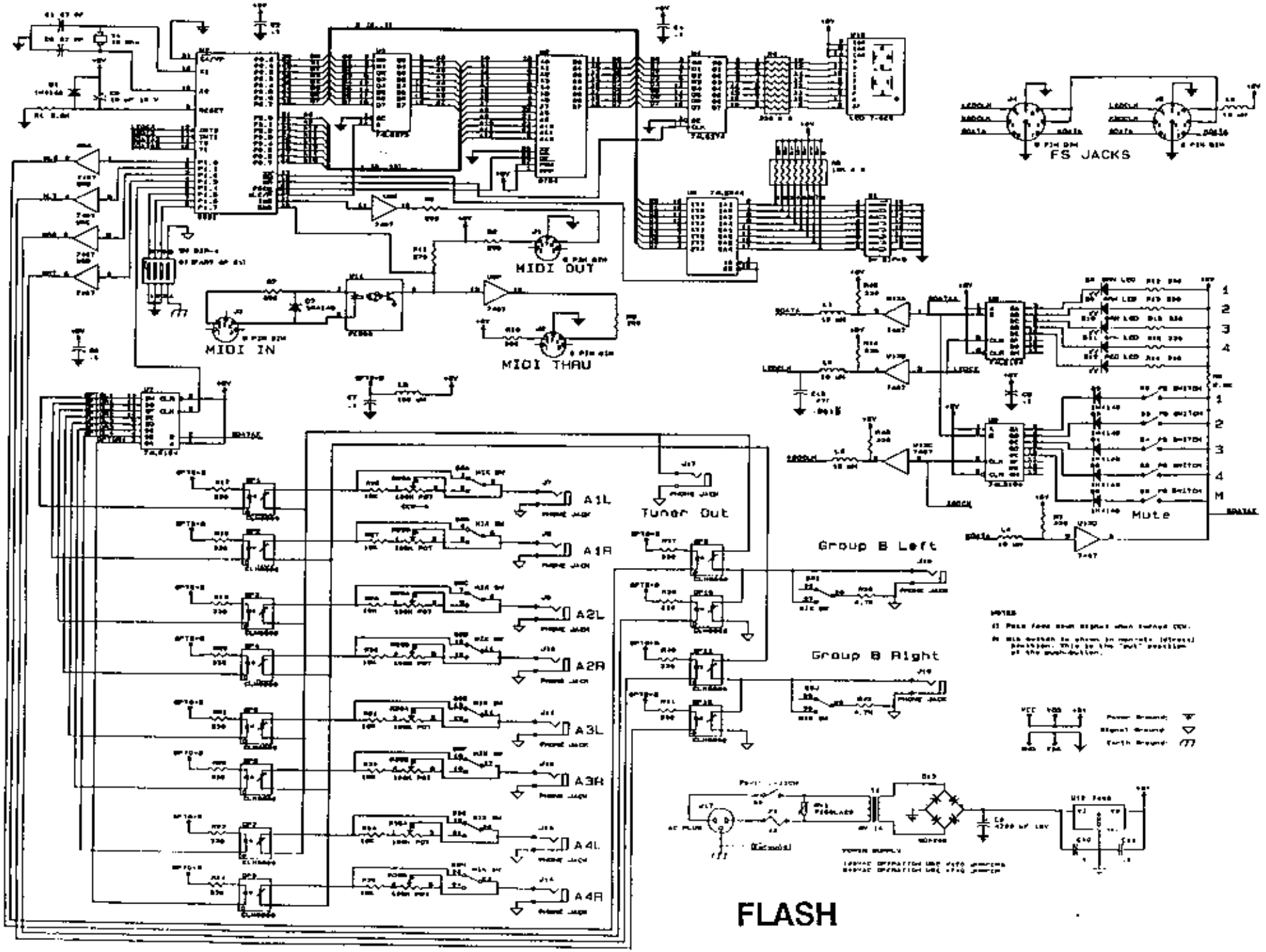
The footpedal jack is connected to the computer circuitry through a 7407 interface which buffers the signals to and from the pedal. This arrangement allows multiple footpedals to be connected in parallel.

Power is supplied to the computer circuitry using a standard circuit arrangement consisting of a transformer, rectifier, filter capacitor, and voltage regulator IC. Voltage selection is available for either 120 or 240 volt operation through voltage selection jumpers located on the main PC board. Ground lift is supplied on DIP switch #12. This switch can be used to connect the audio ground to the chassis ground, or to provide ground lift by disconnecting this line.

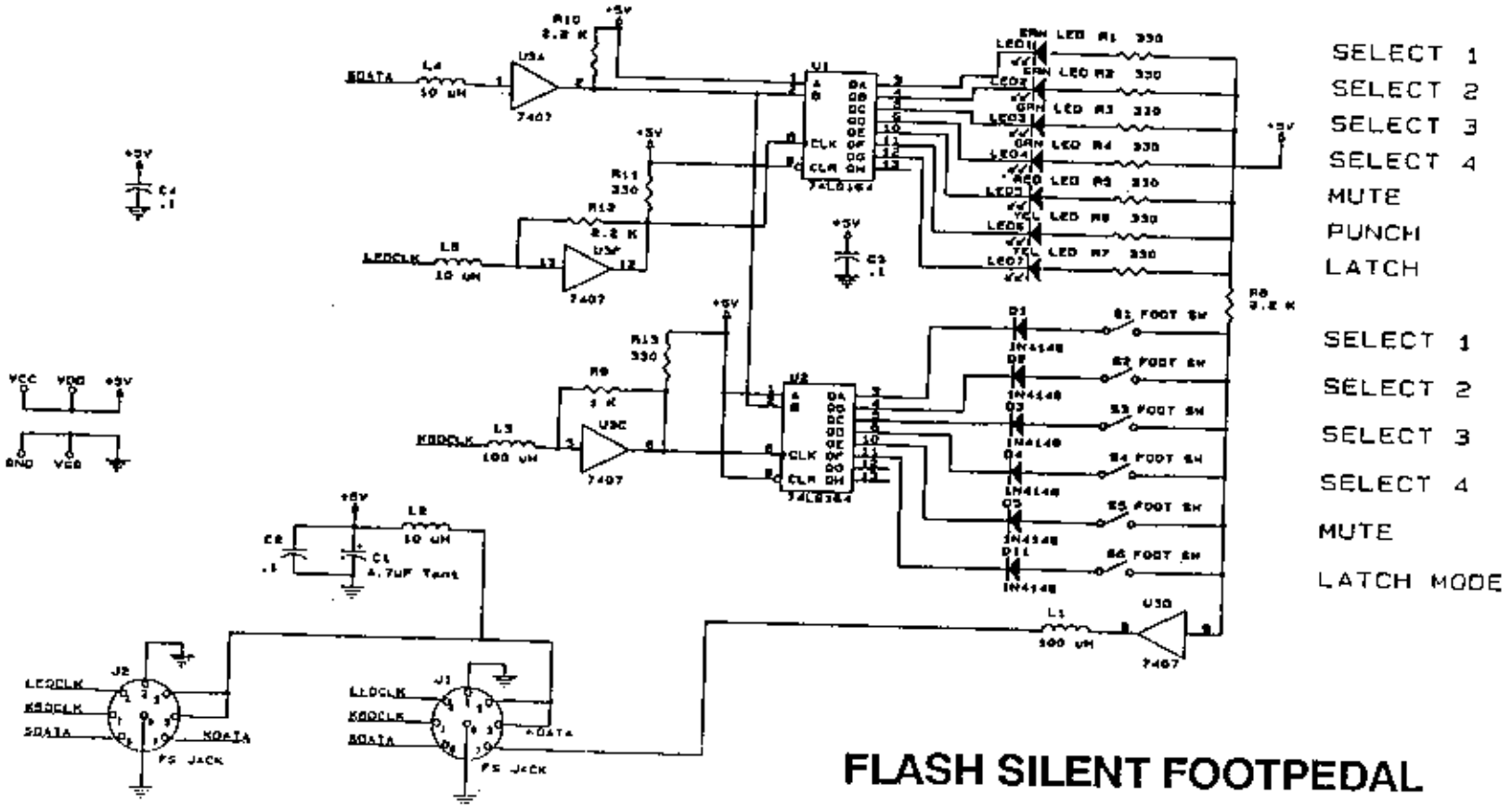
APPENDIX 6

Schematics

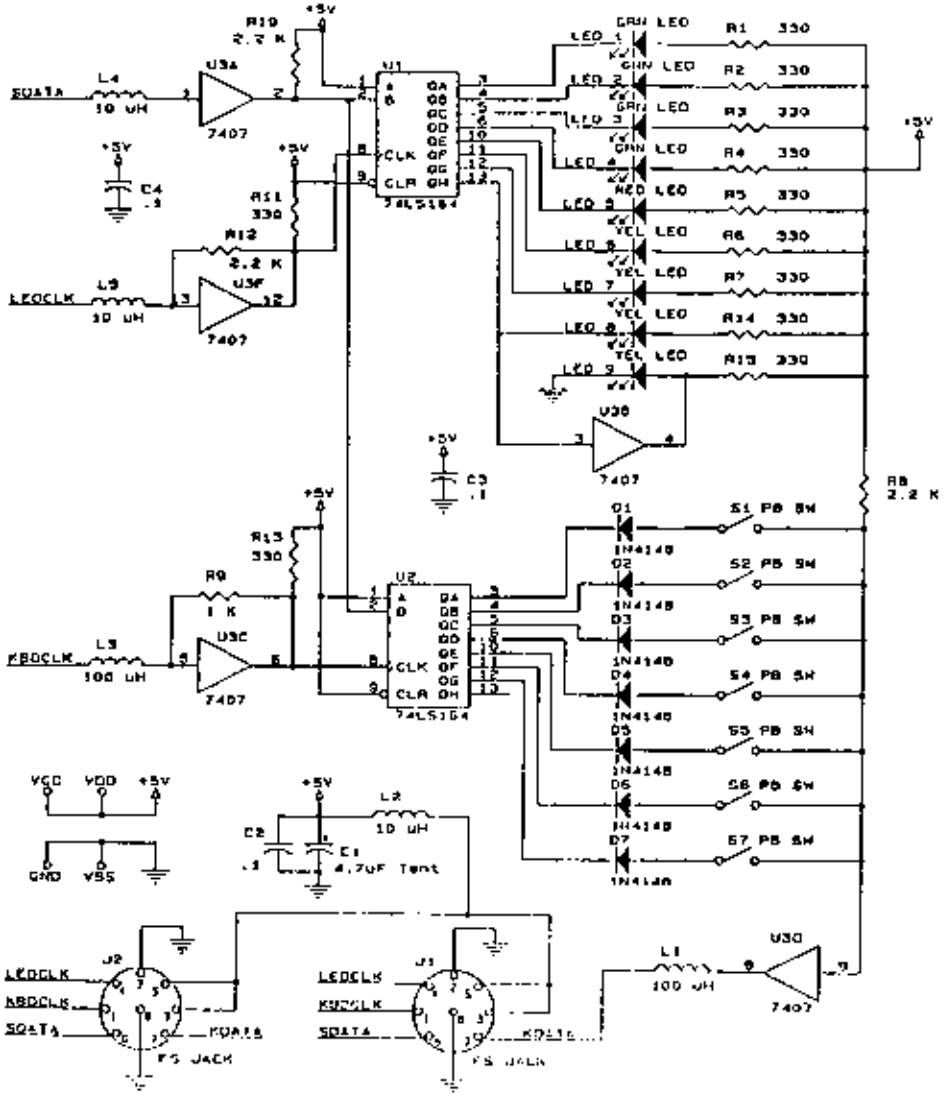
Full-sized plots of a complete set of FLASH schematics are available for $5 shipping and handling. If you are interested please contact Uptown Technologies, Inc., 303 W. Main, Whitewater, WI 53190. Phone: 414-473-1088. Fax: 414-473-8809.


MIDI OUT
MIDI IN
MIDI THRU
FS JACKS
A1L
A1R
A2L
A2R
A3L
A3R
A4L
A4R
Tuner Out
Group B Left
Group B Right
Mute

FLASH



FLASH SILENT FOOTPEDAL



FLASH HAND REMOTE

A design for Do-It-Yourselfers. This remote offers a control function for toggling MUTE between latch and momentary modes.

TECH NOTE – MULTIPLE LOOP SELECTION PROBLEMS (AND HOW TO DEAL WITH THEM)

Multiple loop selection of effects is a great application, and we've had lots of success with it on stage and in the studio. On the other hand, there are some devices out there which can loop-selected successfully **only if you know what you are doing.** This isn't their fault. It also isn't FLASH's fault. It's just the way things are, electrically, out there in the real world.

PROBLEM #1 – LOOPING WITH BOXES THAT PROVIDE ULTRA-HIGH GAIN

Certain extremely high-gain boxes (such as distortion-sustainers), when looped, go crazy. Literally. They squeal whenever they are selected and oscillate/radiate so violently when not selected that the noise they are generating will actually bleed through the bus and be audible anyway. We have seen this with a Korg A3 set to its "Jimi" patch, with a Rockman Sustainer, and with a Boss Distortion-Sustainer pedal.

We want to stress that this is not FLASH's fault, per se; it is just that high-gain units are tricky tools. So tricky, in fact, that they require considerable pampering, especially when hooked up to a passive mixing system like FLASH.

The nature of these devices is that they are extremely sensitive to any kind of electrical coupling (a Rockman Sustainer, for example, will pick up AC cord signal if you bring a connected cable-tip within a half-inch of a power line). Inside FLASH the signals are traveling on the same circuitboard, some of them within fractions of an inch of each other. With normal audio levels this is no problem. With the kind of Sound-On-Steroids signal level pumped out by serious guitar sustain boxes, however, you do indeed get electrical problems like unexpected squeal and oscillation.

Two things tend to aggravate these electrical problems.

- **If your source is a guitar.** A guitar is not what you would call a strong source, electrically: it is not robust in its ability to override other signals. It is a high impedance signal, and anything problematical in your audio is going to be worse with a high impedance signal.
- **If your effects are designed primarily for guitars.** The inputs of devices which are meant to hook to guitars also have very high impedances, so they don't load the guitar.

Together, these two compound the difficulty of using high-gain boxes in a loop, since they create an extremely sensitive electrical input that is sort of "flapping in the breeze" because it is only slightly loaded. So any cross-coupling or noise that is present in the signal has a very easy path to your ears.

Two types of coupling can occur when you plug something into FLASH in a loop selection application. First, there is audio ground loop coupling that comes from tying the input and output grounds on the device together. (In the case of distortion-sustainer devices this can be a serious problem. In the case of virtually everything else it is totally benign and, in fact, sometimes beneficial). The second type is the two picofarads of cross-coupling that exists within FLASH's switching network. This is close to nonexistent but still large enough for an extremely high-gain signal to take advantage of. (For the record, two picofarads of cross-coupling is about the same as taking two pieces of fully-insulated wire and twisting them together four times.)

We should mention that we have not seen this behavior in all high-gain boxes. The Muff Fuzz doesn't do it, for example, because its response is different than those boxes we tested which caused trouble.

THE SIMPLEST FIX

Reduce the gain and/or distortion level settings on the high-gain box until the problem goes away. This will always solve the problem. However, it may also not give you the sound you want, in which case one of the fixes below should be tried.

THE TWO-STEP BASIC FIX

Step one, lower the impedance going to the unit that is freaking out. To do this use a "loaded" cable – one with a resistor soldered between the ground and the hot pin inside the connector. A resistor value between 1K and 10K is recommended. The smaller the value, the heavier the loading. Use the highest value which solves the problem. This loaded cable trick cures any oscillation because it can reduce cross-coupling by a factor of 50 (or more).

On the other hand, this can also load the guitar pickup, potentially weakening sound and sustain. Different pickups will respond differently: some will be considerably weakened, while active pickups with signal buffering won't be effected at all. If your signal is weakened by use of a loaded cable, go on to . . .

Step two, buffer and boost the guitar output using any decent guitar-type preamp, or an active signal multiplier such as our own GREAT DIVIDE.

Remember: The best solution requires both a buffered guitar output **and** a loaded cable. A buffered output by itself isn't enough, because when you deselect it the residual capacitance will still be there and the deselected unit will oscillate its living brains out so hard that its signal will crawl through any audio ground loops or paths that are available.

THE TWO-UNIT PARTIAL FIX

Another way to combine high-gain boxes with normal gear in multiple loop selection applications is to use two separate FLASHs, one to send signal to the effects gear and one to receive from them. This solves the oscillation problem because it isolates the units from one another. It doesn't solve the "lack of load" problem, however, since it leaves deselected units to amplify whatever residual noise they might be picking up. In the case of a high-gain box this noise could conceivably be boosted enough to be heard through cross-coupling.

THE MIDI CONTROL FIX

For gear where the problem is related to a specific patch—like the Korg A3—the entire headache can be avoided through MIDI control. All you have to do is remember to turn things on and off in the right order, and never leave a dangerous patch on in a deselected unit.

Example: When MIDI-switching to an A3 with the "Jimi" patch, begin from any other patch first and (1) select the A3 using FLASH; (2) do anything else you need to do; then (3) turn on the JIMI patch. When switching away from it, reverse that order—turn off the "Jimi" patch and then switch FLASH.

Switching will still appear to be instantaneous. The same number of data bytes are involved as for any other MIDI-controlled switching. You just have to make sure you send them in the right order.

PROBLEM #2 — USING HIGH-GAIN GEAR IN LOOPS ALONG WITH BYPASS LOOPS OF PLAIN WIRE

We call this particular problem **Sqwip**, because *sqwip* is what it sounds like. It happens whenever you have an application where you are trying to use a high-gain box and a straight bypass wire in two different loops. Let's say you are switching between the bypass wire and a high-gain distortion box. For just a moment, as the two signals crossfade from one to another, both are on . . . and since one of them is on a plain piece of wire, output is momentarily shorted to input, creating a nice little *sqwip* sound as the offending box briefly hears its own output.

There are four fixes that we know of:

(1) Turn down the gain and/or distortion on the high-gain box until the problem goes away.

(2) Don't mix plain wires and high-gain distortion boxes in a multiple loop selector application.

(3) For the clean path, use an effects device in bypass mode instead of plain wire.

(4) For the clean path, use one channel of an active signal splitter, such as our GREAT DIVIDE, for the clean path.

PLEASE NOTE:

The use of low-gain devices such as phasers, flangers, choruses, delays, octave boxes, and other such processors will generally NOT exhibit any of the loop selection problems described in the previous three pages.

Distribution Amplification MADE EASY

QUAD 1X2 OR DUAL 1X2
PLUS 4 MONO SUMS

DUAL 1X4 OR
SINGLE 1X8

UPTOWN

great divide 2
great divide 4

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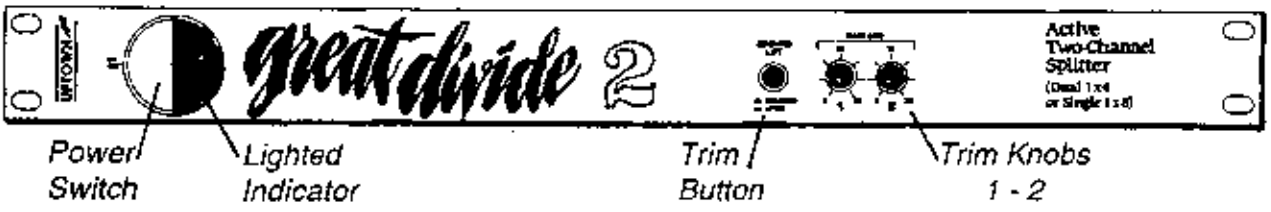
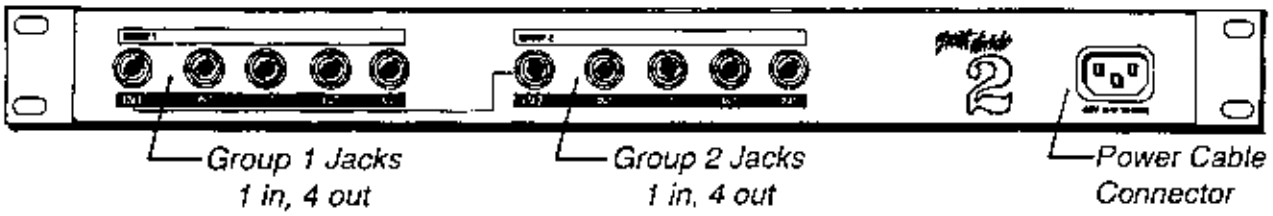
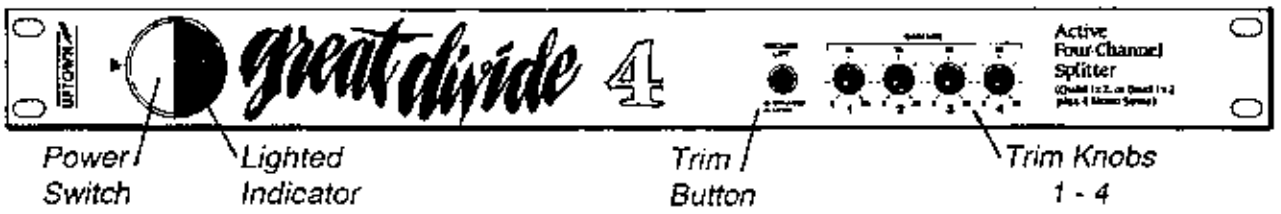
FRONT PANEL



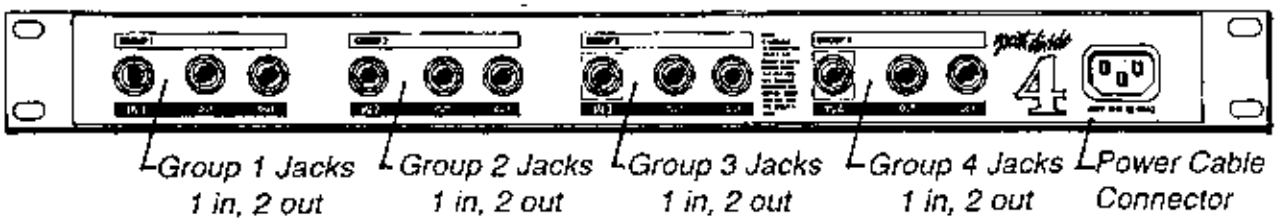
REAR PANEL



FRONT PANEL



REAR PANEL



INTRODUCTION

GREAT DIVIDE is a sonically transparent distibution amplifier for recording studios, guitar and keyboard racks, live sound, theatre and commercial installations, or anywhere parallel or multiple audio path signal routing is a requirement.

FEATURES:

1) Input range of -30 to +21 dB.
2) Up to 20db of gain on each input.
3) Buffered Outputs.
4) Ground Lift Switch.
5) Multiple Configurations.
6) Outstanding Specifications.

WHY UPTOWN BUILDS GREAT DIVIDE 2 and GREAT DIVIDE 4

Different applications require different functions, and we have tried to address these applications as logically as possible. GREAT DIVIDE 2 is optimized for a higher number of outputs per input than GREAT DIVIDE 4. If you need a 1X8 or dual 1X4 splits you should use a GREAT DIVIDE 2.

If your application requires up to 4 discrete channels you should use a GREAT DIVIDE 4. There are a number of diagrams illustrating the various modes of operation of both GREAT DIVIDE 2 and GREAT DIVIDE 4 in the **CONFIGURATIONS** section.

HOW TO APPROACH THIS MANUAL

What you should do to get the most out of this manual depends on who you are.

If you are a *beginner*, take each section in order and try out as many things as you can.

If you are an *audio professional*, you will probably prefer to look over the **APPLICATIONS** section, skim the **TECHNICAL APPENDICES**, and start putting GREAT DIVIDE to work. Consult the manual if you run into difficulties.

Those who feel they belong in the middle of these extremes (i.e., most of us) should read the **INSTALLATION AND OPERATION** section and start exploring the **APPLICATIONS** section for ideas.

INSTALLATION AND OPERATION

INSTALLING GREAT DIVIDE

GREAT DIVIDE can be used either stand-alone or in any 19" rackmount. For stand-alone use we have included attachable rubber feet. For rackmount applications we have included black screws and black protective washers.

Supplying power to GREAT DIVIDE is easy. Just put the detachable power cable that came included with GREAT DIVIDE into the rear panel power jack and plug the other end into an outlet. (If you lose or misplace this cable, any IEC standard 3-prong power cable will work)

When patching GREAT DIVIDE into a system, different applications require different wiring schemes. Use the information in the **APPLICATIONS** section as a guide.

THE IDEAL INSTALLATION

... is always the one that causes you the least grief. In the case of GREAT DIVIDE, this will depend on what you want to do with it. If you only have one task in mind, wire GREAT DIVIDE up that way and then leave it alone. If, however, you want to explore a variety of GREAT DIVIDE applications, we recommend that you either:

1) Keep GREAT DIVIDE out of your rack until you've tested various applications and know what you want to do, or
2) Put GREAT DIVIDE in your rack, making sure you can get to the rear panel, or
3) Best of all, if you have a patchbay, wire every jack on the back of GREAT DIVIDE into it for easy access.

CONNECTING GREAT DIVIDE

All of the 1/4" jacks on the rear panel of GREAT DIVIDE are unbalanced. Ordinary guitar cables are all you need to connect GREAT DIVDE to audio gear.

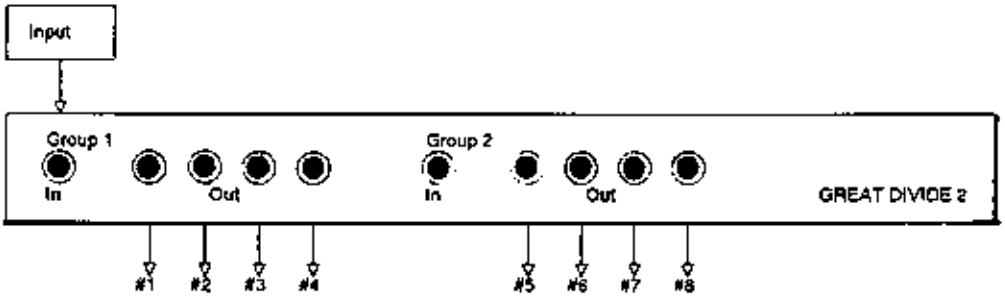
(Please note: By cutting corners on cable and connectors you can significantly decrease both reliability and audio quality. We have had good luck with Canare and Mogame cable, and with Switchcraft and Neutrix connectors. Good cables don't cost much more than average cables, and the difference in performance can be significant.)

CONFIGURATIONS

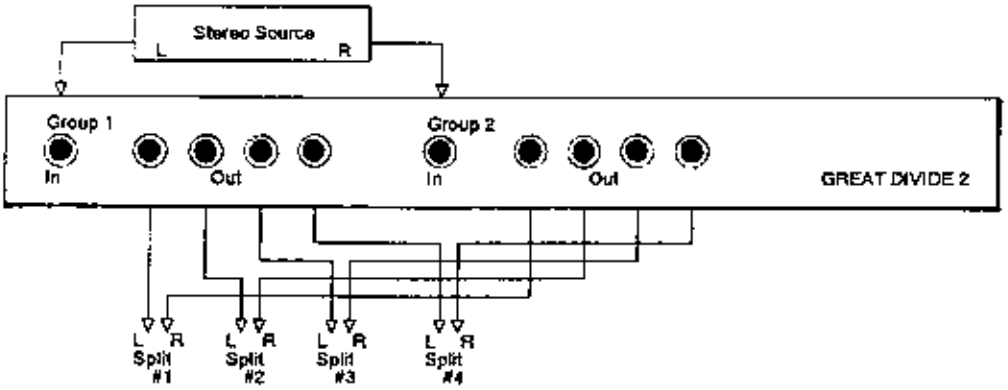
GREAT DIVIDE 2 is a dual 1X4 unit, which can also be thought of as a stereo 1X4 unit. The input of channel 1 is "normalled" to the input of channel 2 by means of a switching jack on input number 2 (this means that if nothing is plugged into input 2, input 2 will "hear" input number 1). GREAT DIVIDE 2 becomes a 1X8 mono splitter when input 2 is not being used,. Individual channel gain control is maintained.

great divide 2

1X8 Mono Split



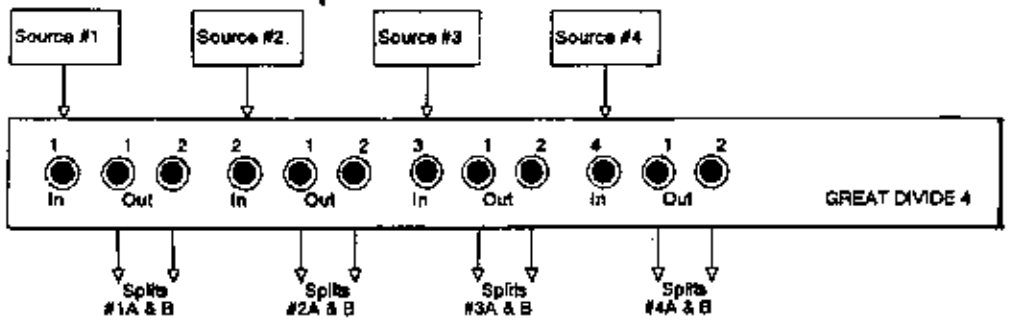
1X4 Stereo Split



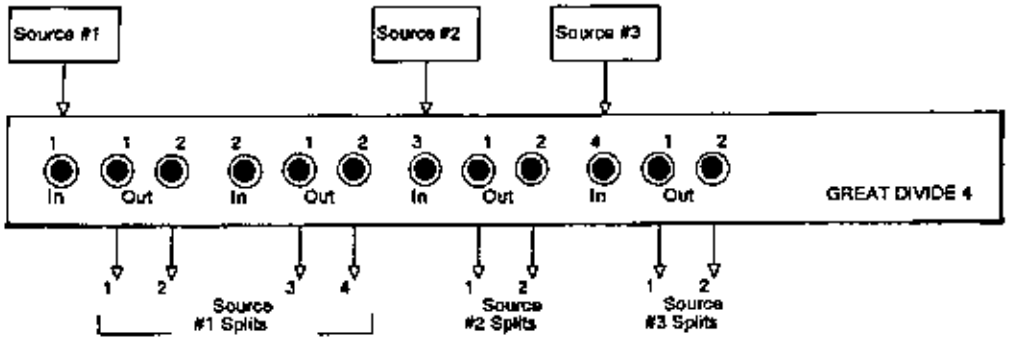
GREAT DIVIDE 4 is a quad 1X2 unit. Each of the four inputs has two outputs with up to +20 db of gain. The input of channel 1 is "normalled" to the input of channel 2 by means of a switching jack on input number 2 (this means that if nothing is plugged into input 2, input 2 will "hear" input number 1). This allows for a 1X4 plus dual 1X2 configuration. When the inputs of channels 3 and 4 are not in use, the outputs of channels 3 and 4 automatically carry the mono sum of channels 1 and 2. This allows correct mono summing of a stereo source while splitting the original stereo signal.

great divide 4

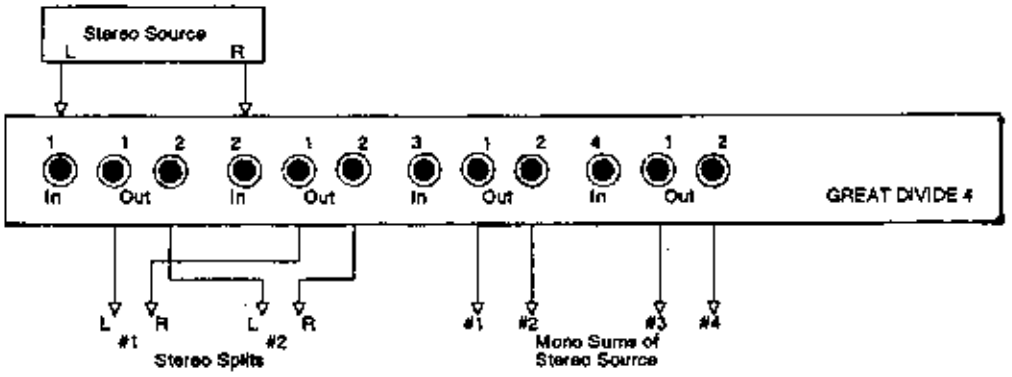
Quad 1X2 Split



1X4 + Dual 1X2 Splits



Stereo 1X2 + 4 Mono Sums



GAIN CONTROLS

GREAT DIVIDE's have individual output controls for each channel, located on the front panel. Each channel has an input range of -30dBu to +21dBu with a maximum output level of +21 dBu, and is capable of supplying a gain range variable from unity (input level=output level) to +20dB (output level is 20dB greater than input level). GREAT DIVIDE 2 is a two channel audio distribution amplifier and GREAT DIVIDE 4 is a four channel audio distribution amplifier.

The front panel gain controls are channelized output controls in any of GREAT DIVIDE 2 or 4's various configurations. When GREAT DIVIDE 2 is patched as a 1X8 mono splitter (input 2 is unused), individual gain control is maintained for each group of outputs. For example, signal can be sent at unity gain from the first four outputs (channel 1), while up to +20dB of gain from the second set of four outputs (channel 2). This allows the output level to be adjusted to meet the input level requirements of the attached equipment. (*Hint to guitar players: running a hotter level into some preamps and signal processors will really improve their sound.*)

GREAT DIVIDE 4 has four channels of gain control, and all four remain active in all configurations. For instance, when in the stereo 1X2 + four mono sum mode, channels 1 and 2 could be used as unity gain buffer amps, channel 3 as a unity gain mono sum of channels 1 and 2, and channel 4 as a +20 dB gain mono sum of channels 1 and 2.

GROUNDING NOISE & THE GROUND LIFT SWITCH

Grounding is one of the great mysteries of audio electronics. It has been said that grounding is as much an art as a science. There's considerable truth to the statement. Getting it right is tough, and we all know the penalty for getting it wrong - **Ground Hum!**

The only real solution is to get your grounding act in order. Some of the things you can try include lifting the ground at one end of the audio cable that is connected to GREAT DIVIDE (keep in mind that at least ONE cable going to GREAT DIVIDE must have a ground that is attached on both ends!); lifting AC ground for either GREAT DIVIDE or the other units in question; making sure that GREAT DIVIDE and everything electrically attached to it is tied to the same ground; isolating all your gear from the rack rails; installing central ground point grounding for your audio system or studio; buying a Juice Goose for your power line...whatever works, works. If you don't know what you are doing, call an expert. **Grounding can be tricky business.**

One technique that works for professional rack builders is to isolate all gear by connecting the ground of each audio cable at only one end (usually the receiving end). Be sure that all your audio gear is isolated from the rack rails to prevent ground loops from occuring through the rack screws. Tie a separate piece of wire from the chassis of each piece of equipment to a central point. This is called a "Star Ground". This technique seems to cure even the worst ground hum/noise problems.

REMEMBER! At least one of the audio cables must make a ground connection to a GREAT DIVIDE input jack. This ground point can be used for a "Star Ground".

The Ground Lift Switch located on the front panel of GREAT DIVIDE determines whether signal ground and chassis ground are connected. Electrical ground is always connected to chassis ground in GREAT DIVIDE, and the ground lift switch does not affect this condition. The best position for the ground lift switch is the setting which results in the least amount of grounding noise.

SIGNAL TYPES

GREAT DIVIDE is designed to work with inputs ranging from -30dBu to +21dBu. This covers everything from low instrument level to professional line level.

DO NOT USE GREAT DIVIDE WITH SPEAKER LEVEL SIGNALS

Using GREAT DIVIDE with amplifier output or speaker level signals will damage GREAT DIVIDE and/or your amplifier and void your GREAT DIVIDE warranty.

Signal Type	Approx. Signal Level	Use with GREAT DIVIDE?
Instrument Level (Guitar, Bass, Direct Box, etc.)	-30db	YES
Semi-Pro Gear (Consumer DAT decks, cassette decks, effects, etc.)	-10db	YES
Professional Gear (Professional mixers, effects, keyboards, etc)	+4db	YES
Amplifier Outputs	**Speaker Level**	**NO**

great divide 2/4

APPLICATIONS

GREAT DIVIDE 2

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GREAT DIVIDE 4

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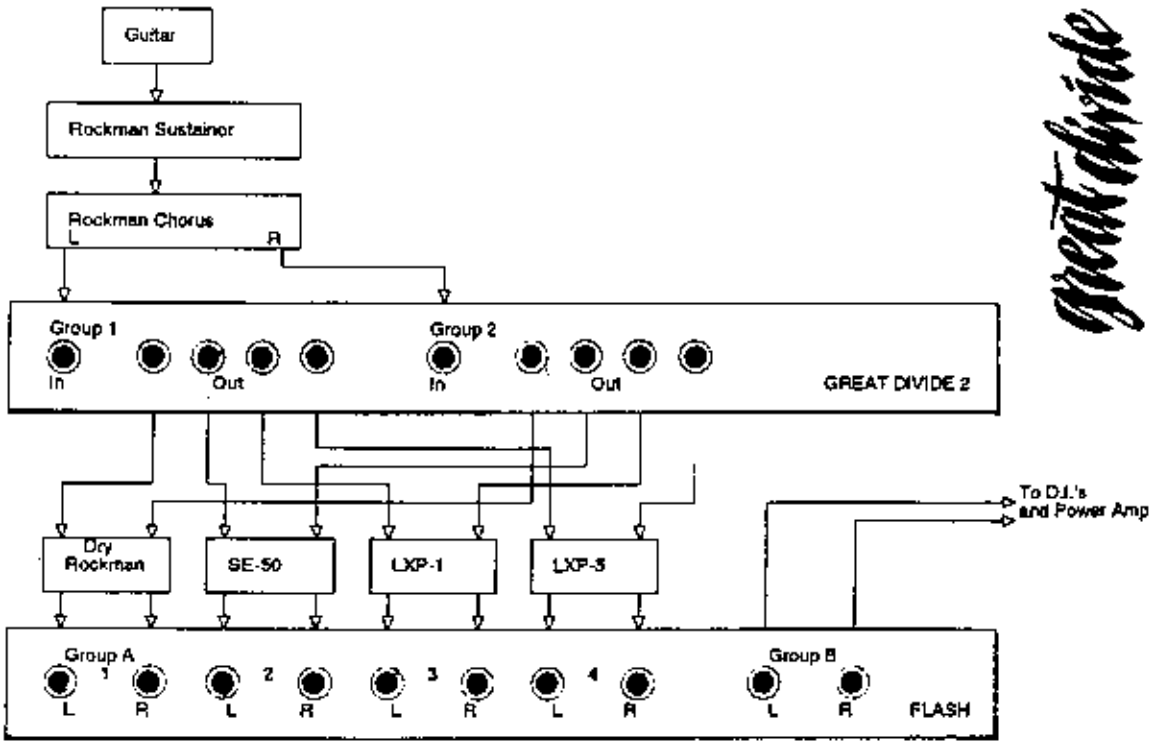
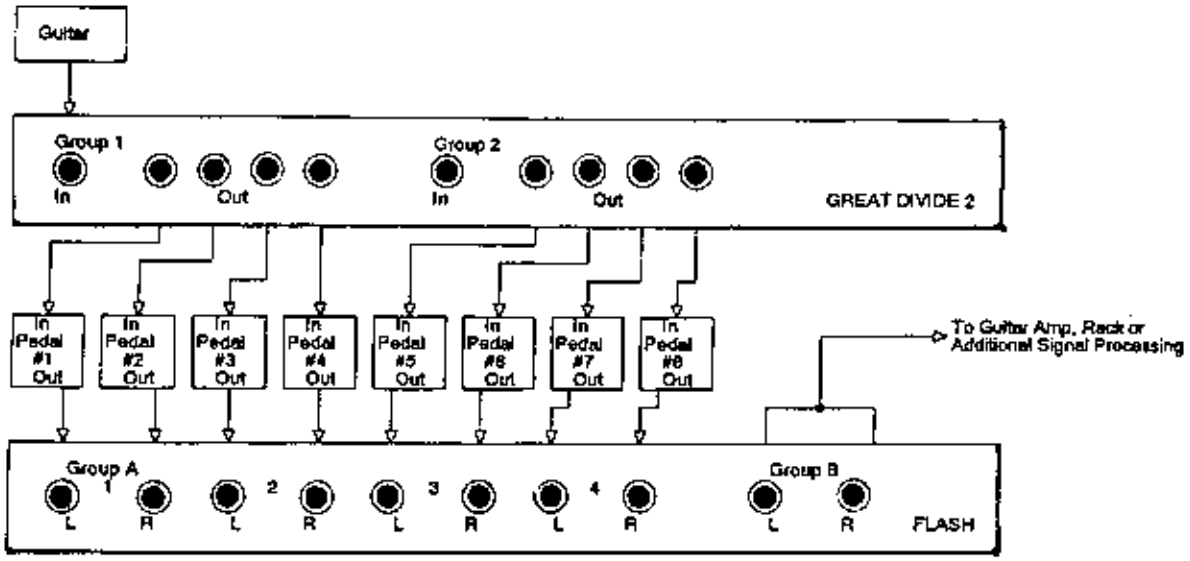
THREE SERIES/PARALLEL EFFECTS....13
GUITAR SYNTH SYSTEM....13
ONE OF FOUR STEREO PREAMPS SELECT....14
TWO HEAD GUITAR SYSTEM....14

Rockman System

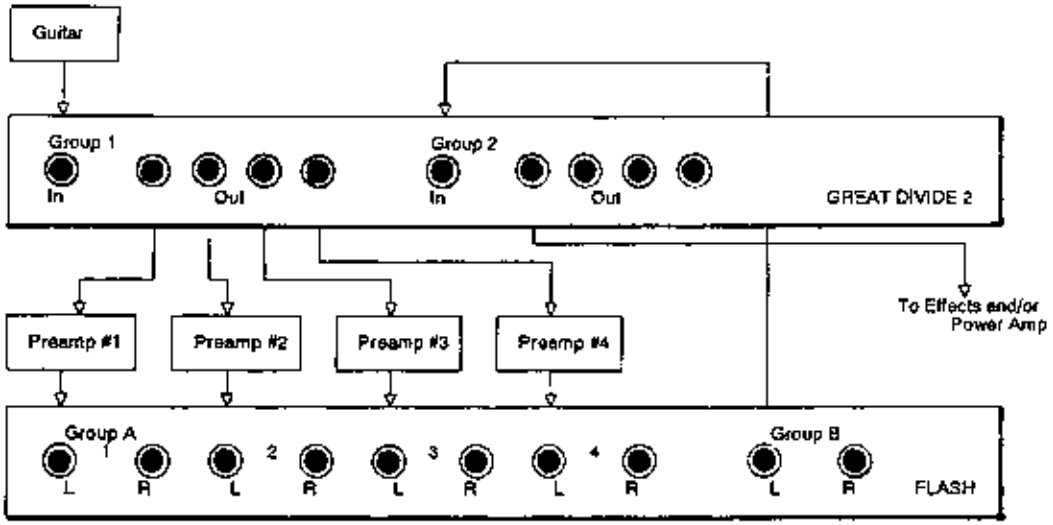


8 FX Pedal Automation System

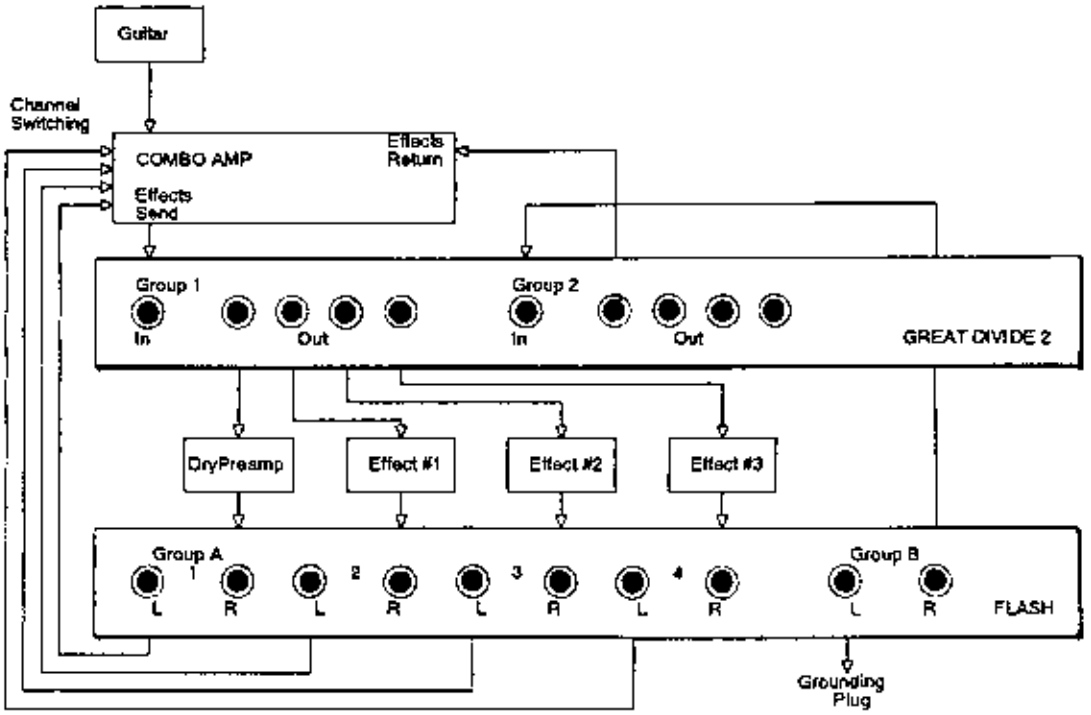


(FLASH Cascade Enable Switch - DIP Switch #10 - should be ON)

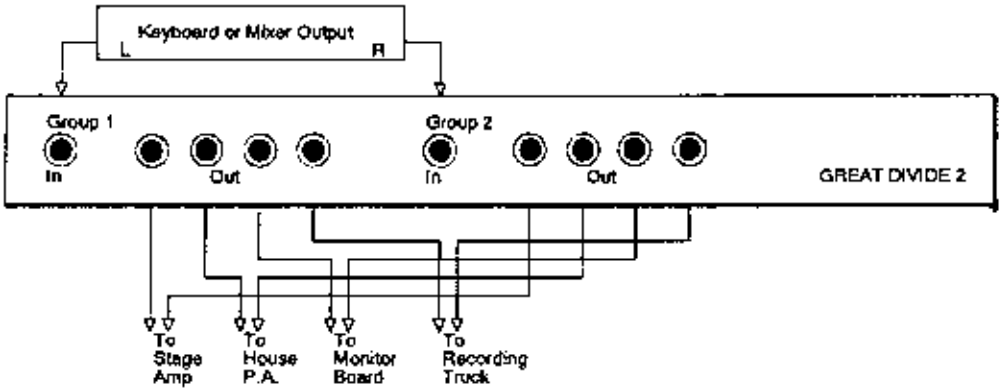
One of Four Mono Preamps Select



Combo Amp System

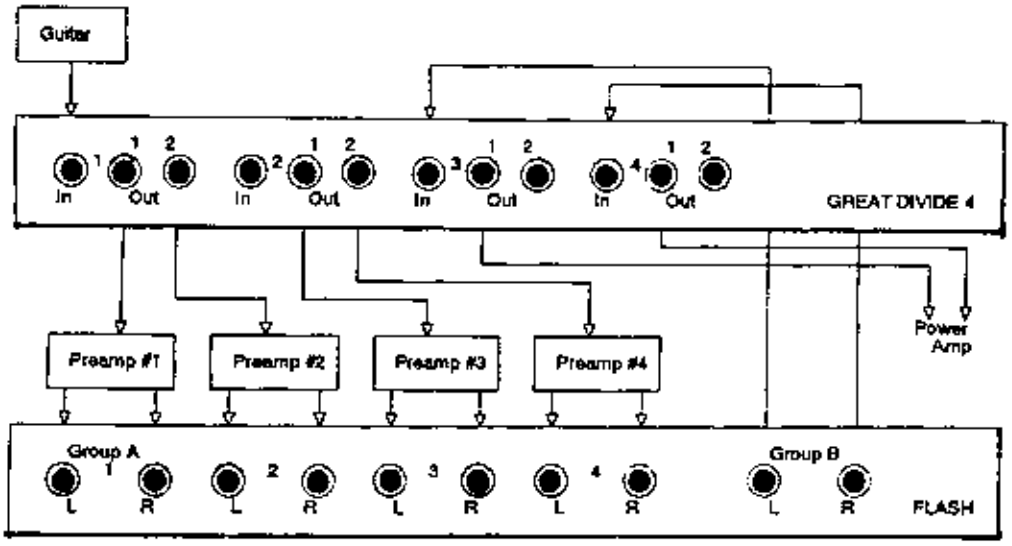


Keyboard/Mixer Distribution

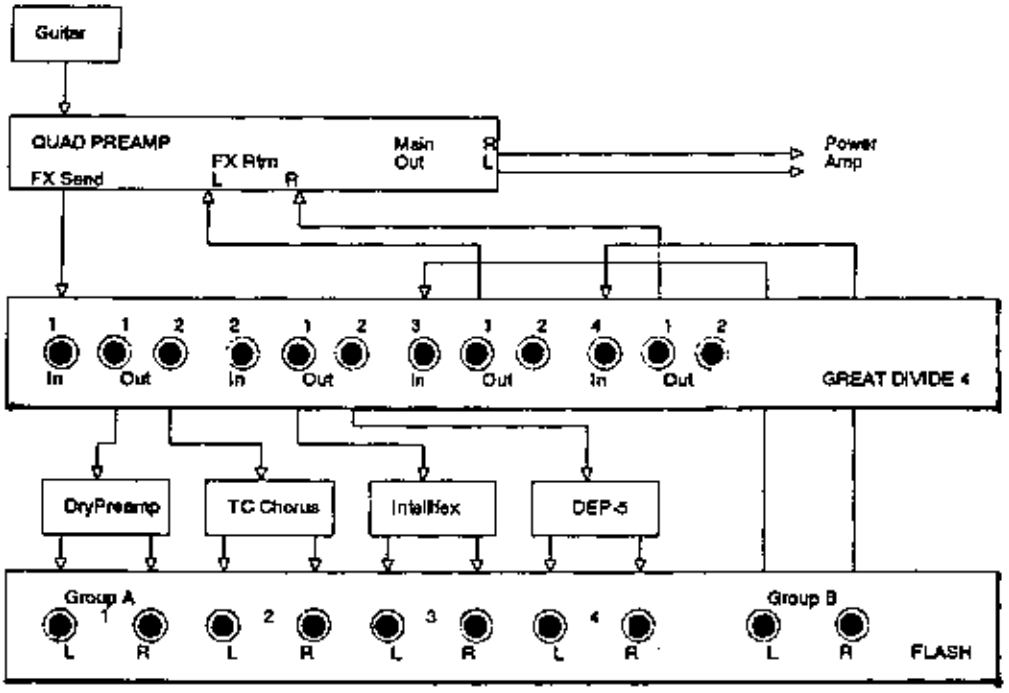


Great Divide 4

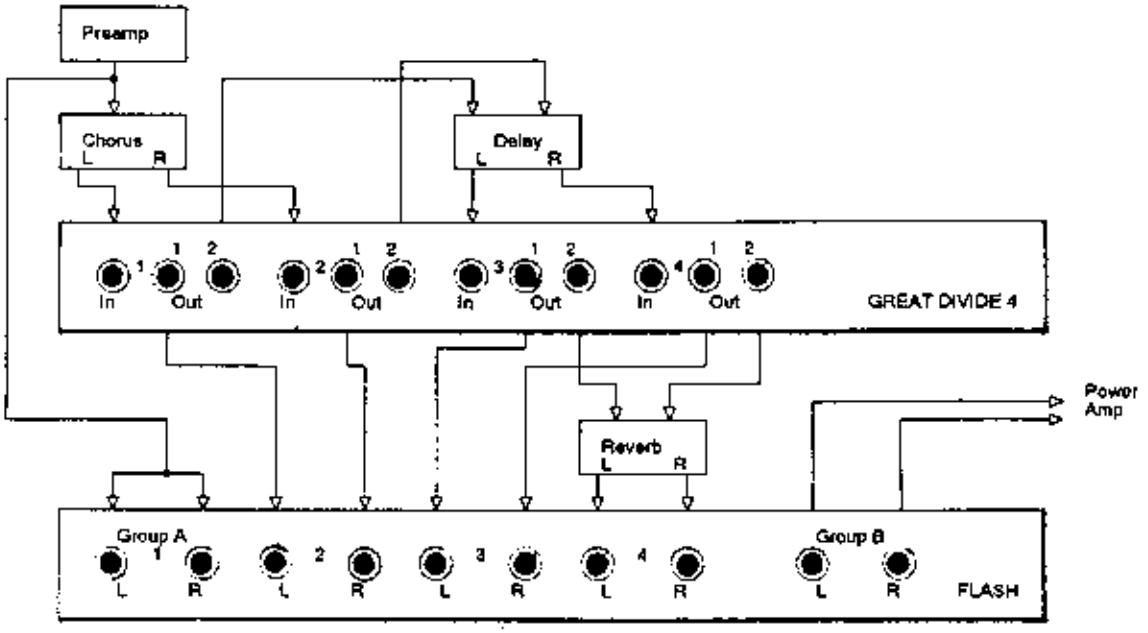
4 Preamp System



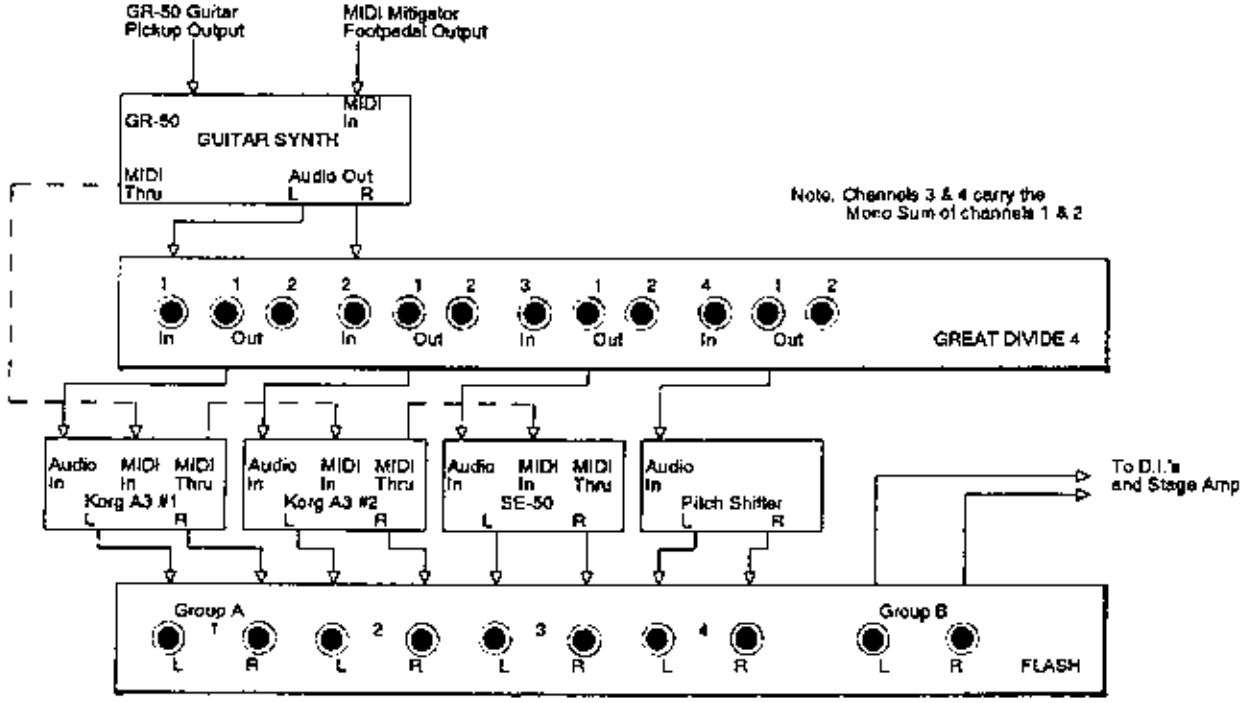
Quad Preamp System



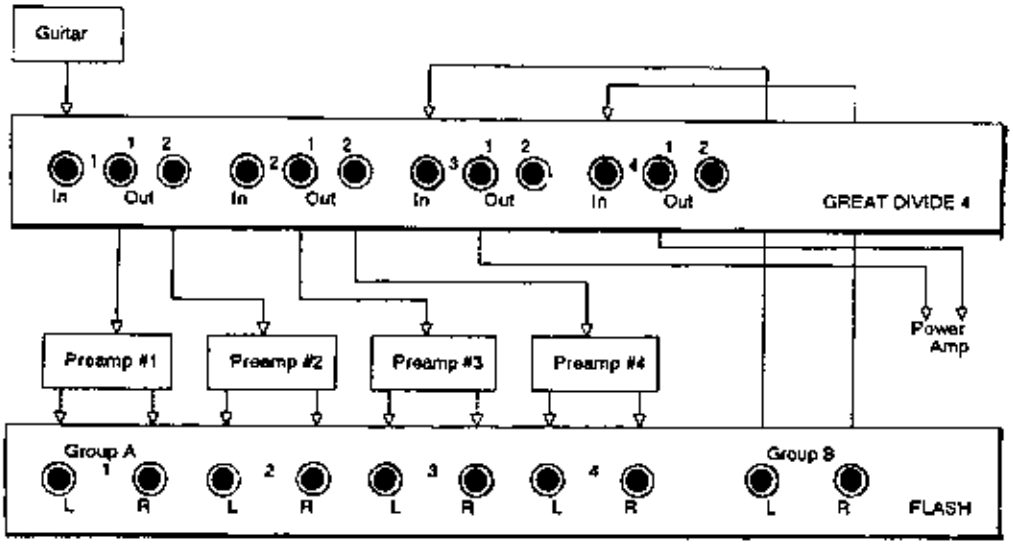
3 Series/Parallel Effects



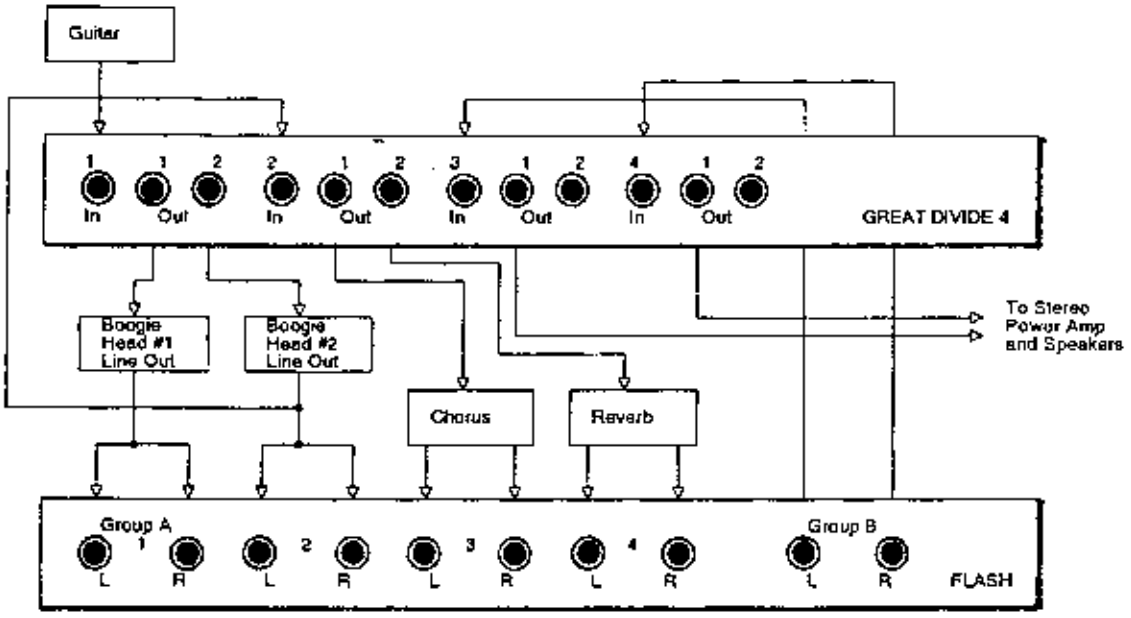
Guitar Synth System



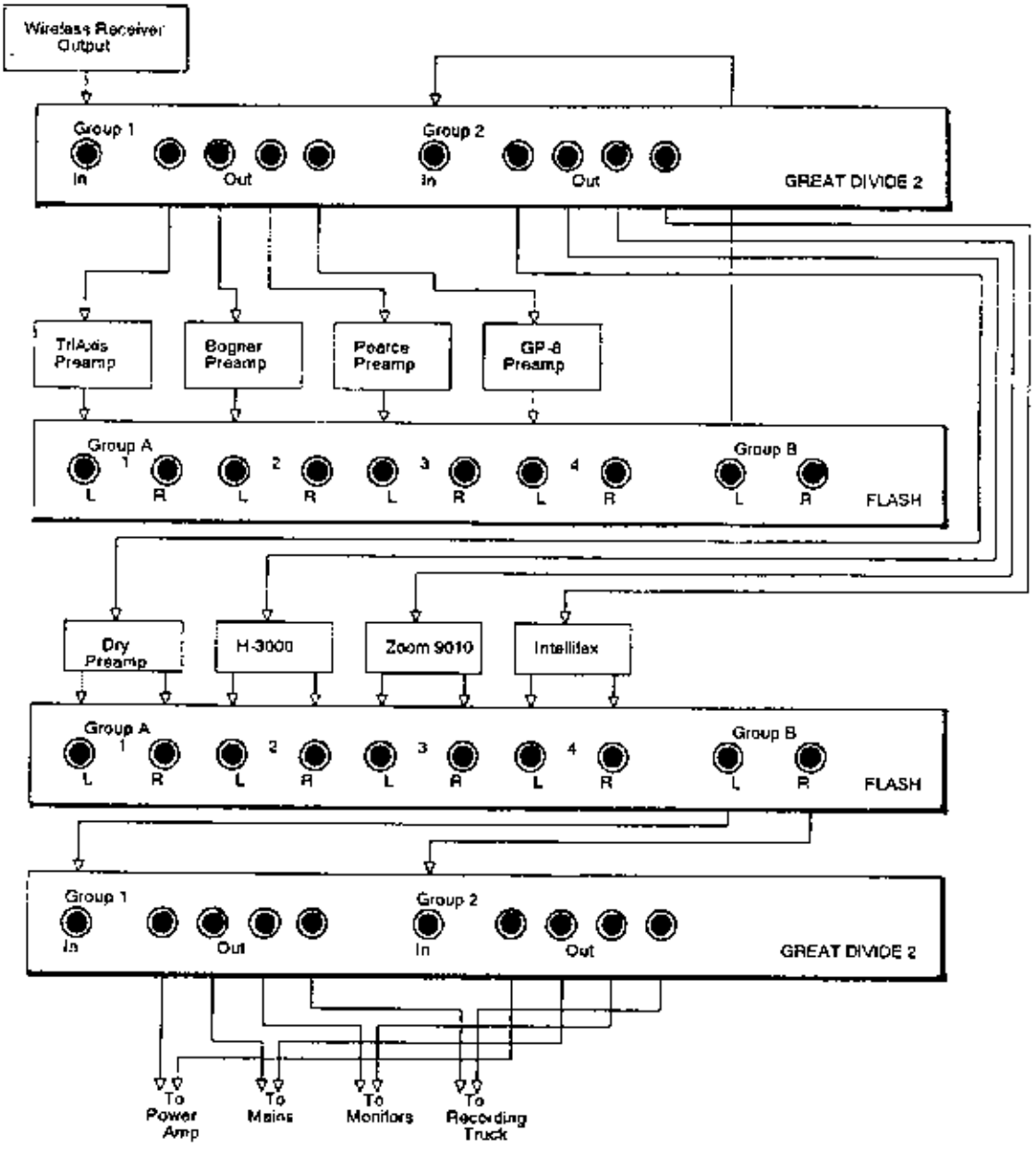
One of Four Stereo Preamps Select



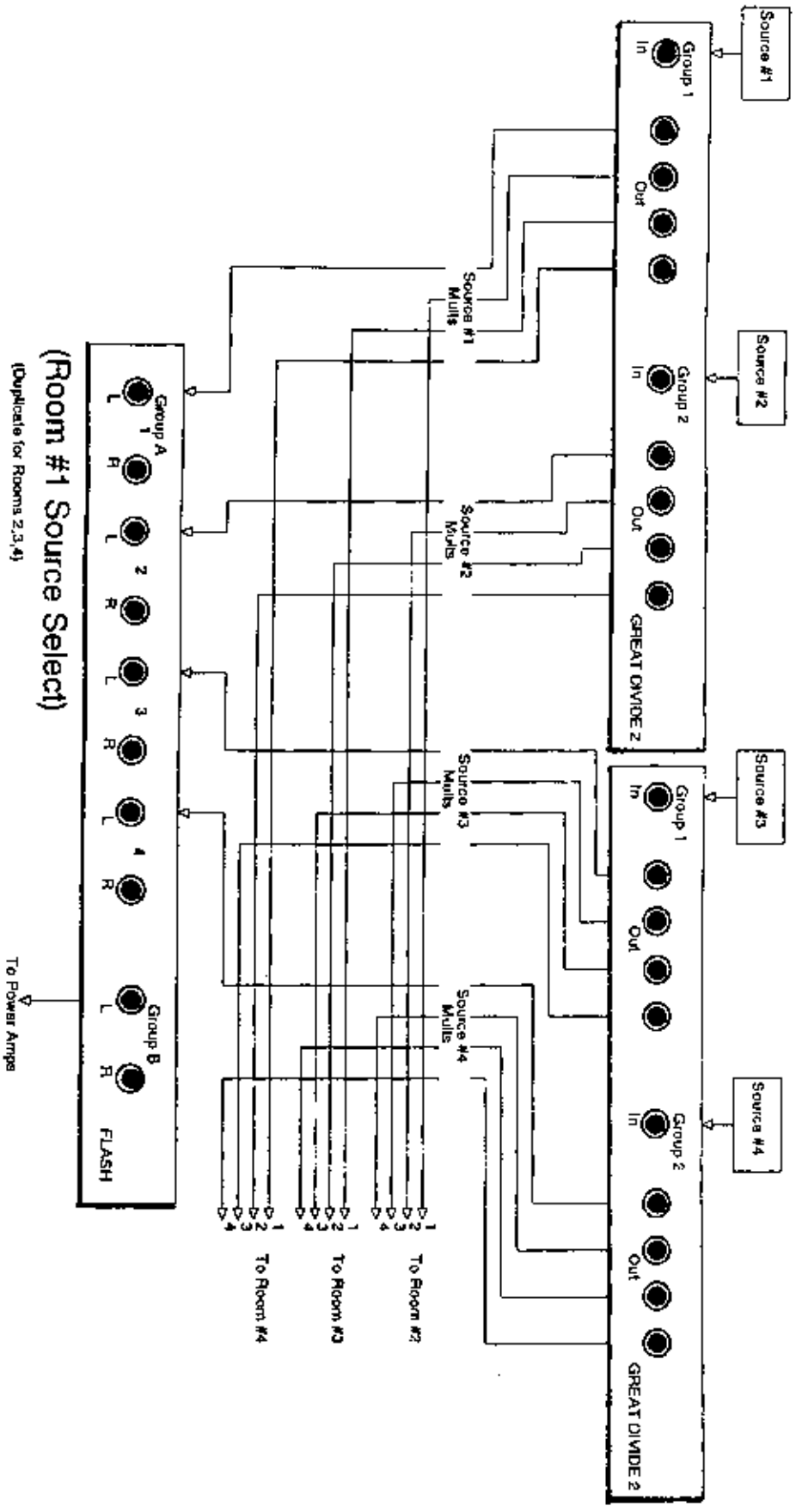
2 Head Guitar System



Guitar Rack


Wireless Receiver Output
Group 1
In
Out
Group 2
In
Out
GREAT DIVIDE 2
TriAxis Preamp
Bogner Preamp
Pearce Preamp
GP-8 Preamp
Group A
1
2
3
4
L
R
Group B
FLASH
Dry Preamp
H-3000
Zoom 9010
Intellifax
Group A
Group B
FLASH
Group 1
In
Out
Group 2
In
Out
GREAT DIVIDE 2
To Power Amp
To Mains
To Monitors
To Recording Truck

4 Mono Audio Source to 4 Destination System



UNIT AND AUDIO SPECIFICATIONS

GREAT DIVIDE 2

Description:	Stereo 1X4 or Mono 1X8 Audio Distribution Amplifier
Dimensions:	Standard 1-High rackmount (front)
	1 5/8"h X 17"w X 9"d (chassis)
Weight:	7 lbs.
Electrical:	120V 25W 50-60Hz
Max Input:	+21 dBu
Max Output:	+21 dBu
	0 dBu = 0.775Vrms
Controls:	on/off switch
	gain control knobs (2)
	ground lift switch
Indicators:	power on leds
Connectors:	1/4" mono inputs (2)
	1/4" mono outputs (8)
	IEC 3 pin AC power jack
Power:	internal transformer with plug-in IEC standard cable
Suppression:	All inputs and outputs RF (Radio Frequency) suppressed

GREAT DIVIDE 4

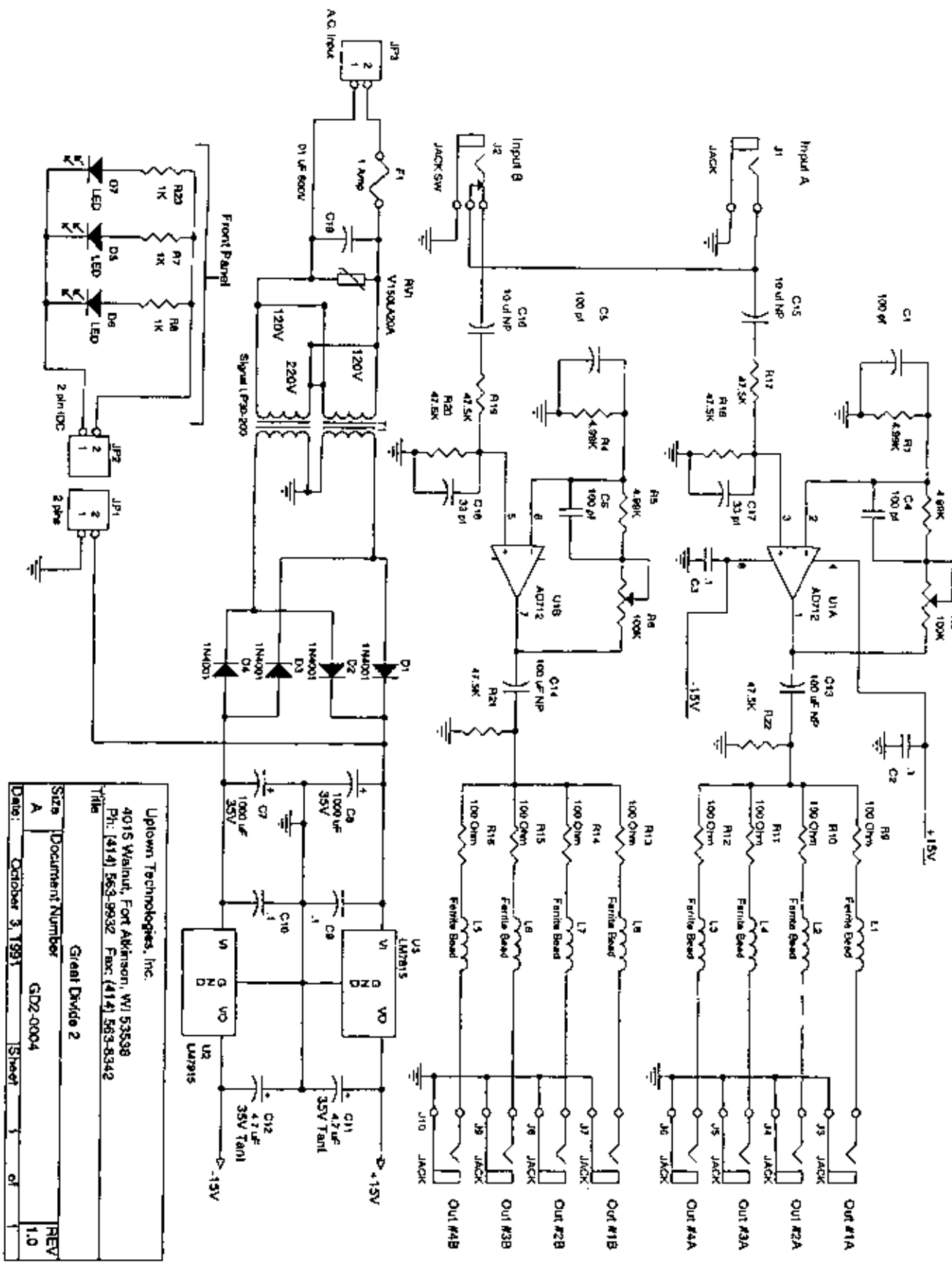
Description:	Multiple configuration Quad 1X2 Audio Distribution Amplifier
Dimensions:	Standard 1-High rackmount (front)
	1 5/8"h X 17"w X 9"d (chassis)
Weight:	7 lbs.
Electrical:	120V 25W 50-60Hz
Max Input:	+21 dBu
Max Output:	+21 dBu
	0 dBu = 0.775Vrms
Controls:	on/off switch
	gain control knobs (4)
	ground lift switch
Indicators:	power on leds
Connectors:	1/4" mono inputs (4)
	1/4" mono outputs (8)
	IEC 3 pin AC power jack
Power:	internal transformer with plug-in IEC standard cable
Suppression:	All inputs and outputs RF (Radio Frequency) suppressed

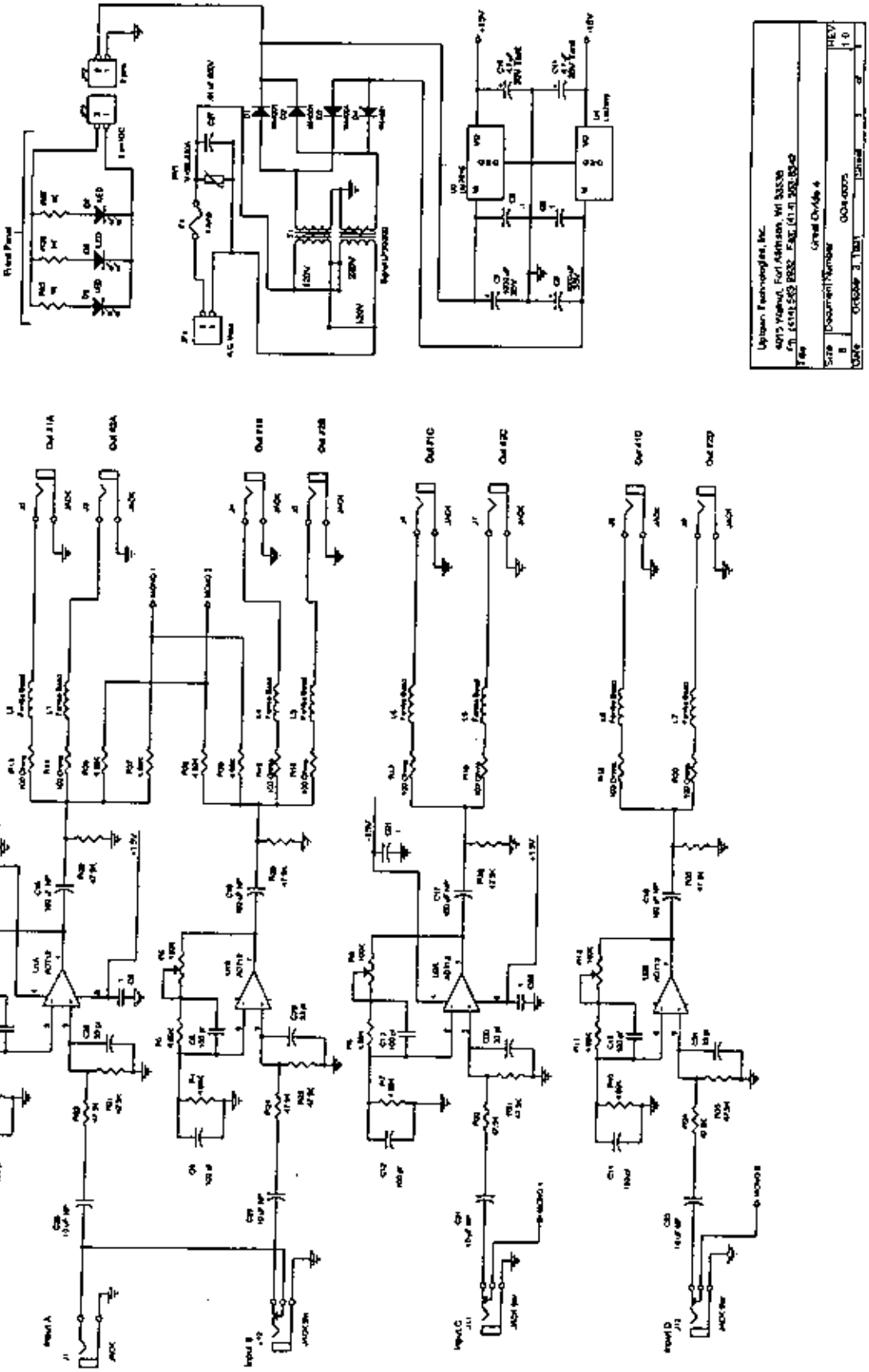
TESTED AUDIO SPECS:

Signal/Noise:	- 103dB (ref. 0dBu at unity gain)
Gain Range:	Unity - +20db
THD:	< .005% (ref. 0dBu at unity gain)
Freq. Resp.:	20-20K hz +/- .1 db (0 - +20dB gain)
Crosstalk:	-90dB at 1K (at unity gain)
	0dBu = 0.775Vrms

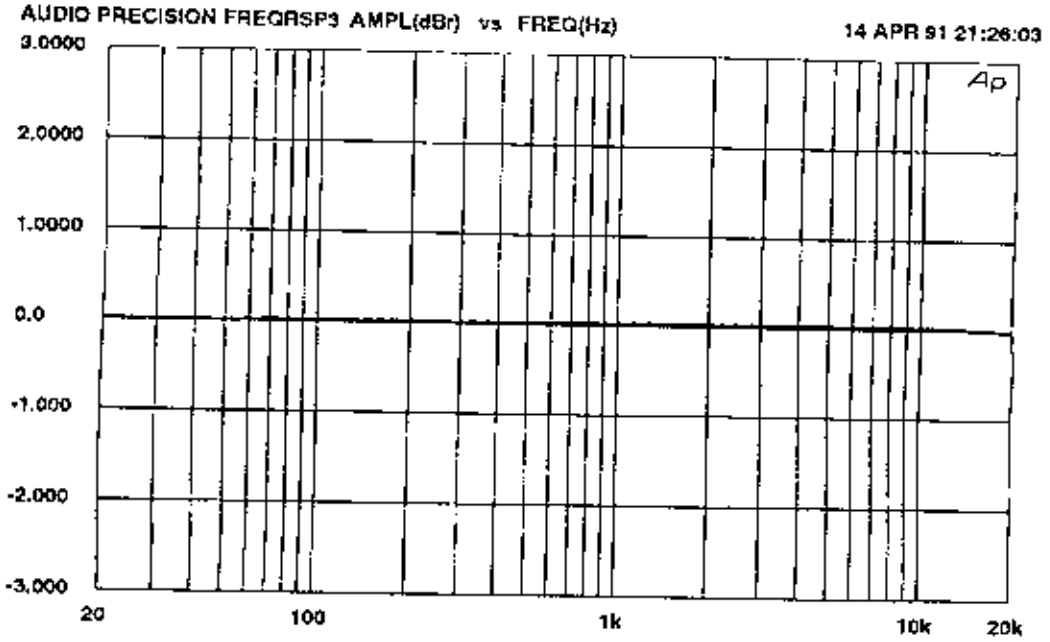
great divide 2

great divide 4

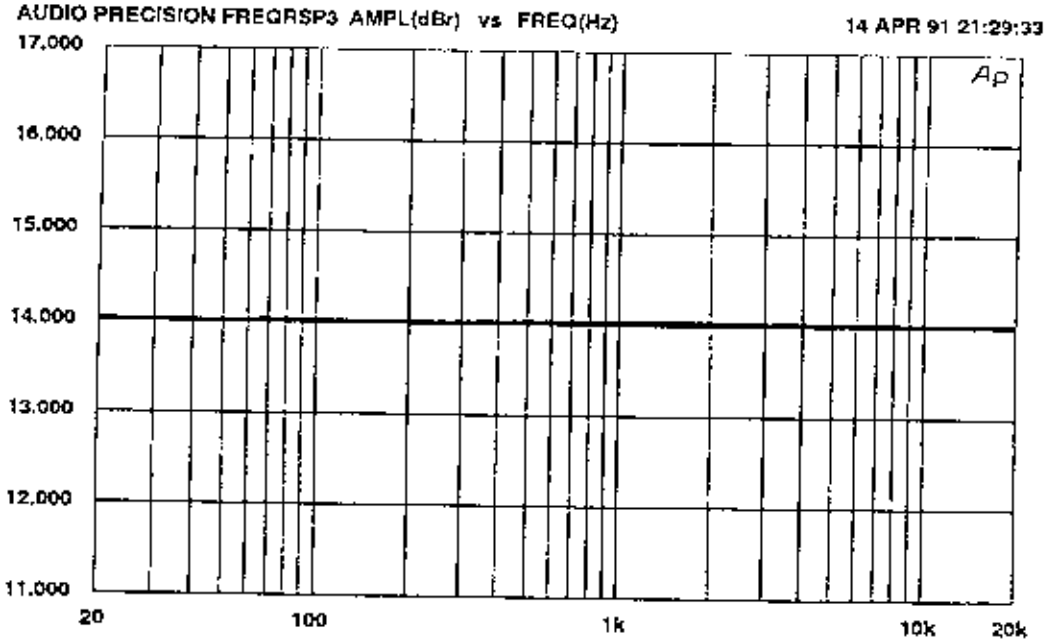

Input A
Input B
Front Panel
AC Input
Signal Pgm 200
120V
220V
Out #1A
Out #2A
Out #3A
Out #4A
Out #1B
Out #2B
Out #3B
Out #4B
+15V
-15V
Uptown Technologies, Inc.
4015 Walnut, Fort Atkinson, WI 53538
Ph: (414) 563-9832 Fax: (414) 563-8342
Great Divide 2
Document Number
GD2-0004
REV
1.0
October 3, 1991
Sheet
of



FREQUENCY RESPONSE AT UNITY GAIN



FREQUENCY RESPONSE AT 20 dB GAIN



UPTOWN IS HAPPY TO PROVIDE CONSULTATION, BLOCK DIAGRAMS, AND SYSTEM INSTALLATION ADVICE UPON REQUEST. PLEASE FEEL FREE TO CALL OUR TECH SUPPORT LINE AT 414-563-9932.